SERVICE MANUAL

VersaCare™ Bed

From Hill-Rom

Product No. P3200/P3201

For Parts or Technical Assistance
USA 800-445-3720 Canada 800-267-2337
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VersaCare™ Bed Service Manual

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NOTES:

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Chapter 1 Introduction

Purpose

This manual provides requirements for the VersaCare™ Bed normal operation and maintenance. It also includes parts lists (in chapter 5) for ordering replacement components.

Audience

This manual is intended for use by only facility-authorized personnel. Failure to observe this restriction can result in severe injury to people and serious damage to equipment.

Organization

This manual contains seven chapters.

Chapter 1: Introduction

In addition to a brief description of this service manual, chapter 1 also provides a product overview.

Chapter 2: Troubleshooting Procedures

Repair analysis procedures are contained in this chapter. Use these procedures to gather information, identify the maintenance need, and verify the effectiveness of the repair.

Chapter 3: Theory of Operation

This chapter describes the application of the mechanical, electrical, and hydraulic systems employed in this product.

Chapter 4: Removal, Replacement, and Adjustment Procedures

Chapter 4 contains the detailed maintenance procedures determined necessary in chapter 2.

Chapter 5: Parts List

This chapter contains the warranty, part-ordering procedure, and illustrated parts lists.

Chapter 6: General Procedures

Cleaning, preventive maintenance, and other general procedures are described in this chapter.

Chapter 7: Accessories

A list of additional products, that can be used in conjunction with the VersaCare™ Bed, is available in chapter 7. Installation procedures for these accessories are also included.

Document Symbol Definition

This manual contains different typefaces and icons designed to improve readability and increase understanding of its content.

Note the following examples:

- Standard text—used for regular information.
- **Boldface text**—emphasizes a word or phrase.
- **NOTE:**—sets apart special information or important instruction clarification.
- The symbol below highlights a WARNING or CAUTION:

Figure 1-1. Warning and Caution

  - A WARNING identifies situations or actions that may affect patient or user safety. Disregarding a warning could result in patient or user injury.
  - A CAUTION points out special procedures or precautions that personnel must follow to avoid equipment damage.
- The symbol below highlights a CAUGHT HAZARD WARNING:

Figure 1-2. Caught Hazard Warning

- The symbol below highlights a CHEMICAL HAZARD WARNING:

Figure 1-3. Chemical Hazard Warning

- The symbol below highlights an ELECTRICAL SHOCK HAZARD WARNING:

Figure 1-4. Electrical Shock Hazard Warning

Overview

The VersaCare™ Bed is intended for low to moderate acuity patients in the medical/surgical area of the hospital. The VersaCare™ Bed can also be used as a general-purpose variable height hospital bed for general care, post-operative care, and general medicine wards.

For additional information regarding the VersaCare™ Bed, refer to the *VersaCare™ Bed User Manual* (usr119).

Before servicing the VersaCare™ Bed, be sure that you have read and understood in detail the contents of this manual. It is important that you read and strictly adhere to the aspects of safety contained in the this manual.

Specifications

For VersaCare™ Bed specifications, see table 1-1 on page 1-5.

Table 1-1. Specifications

Feature	Dimension
Total Length:	
Foot Section Extended	94.5" (240.0 cm)
Foot Section Retracted	82.5" (210.0 cm)
Maximum Width (siderails stored)	37" (94 cm)
Maximum Width (siderails up)	40" (102 cm)
Maximum Headboard Height	39.5" (100 cm)
Mattress to Siderail Height	9.5" (24 cm)
Minimum Under-Bed Clearance	3" (8 cm) 1.25" (3.18 cm) for IntelliDrive® Transport System beds
Wheel Base	26.75" x 62" (67.95 cm x 157.48 cm)
Surface Dimensions:	
Surface Width	35.5" (90 cm)
Surface Length	86.4" (219.5 cm)
Surface Mattress Thickness	8" (20 cm) (measured in the center of the mattress)
Surface Weight	25 lb (11 kg) for treatment, 26 lb (12 kg) for short stay
Caster Size	5" (13 cm) standard, or 6" (15 cm) optional (standard on IntelliDrive® Transport System beds)
Bed Lift Capacity (safe working load) (includes patient weight, mattress, IV poles, and such)	550 lb (249 kg)
Total Weight without Surface	495 lb (224 kg)
Head Section Inclination (maximum)	65°
Knee Section Inclination (maximum)	16°
Foot Section Inclination (maximum)	-27°

Feature	Dimension
Bed Height Range, Lowest Position (with mattress)	18" (46 cm) without IntelliDrive® Transport System 22" (56 cm) with IntelliDrive® Transport System
Bed Height Range, Highest Position (with mattress)	37" (94 cm) without IntelliDrive® Transport System 38" (97 cm) with IntelliDrive® Transport System
Trendelenburg Position (maximum)	15°
Reverse Trendelenburg Position (maximum)	10°
Siderail Opening Size	3.5" (8.9 cm)

Environmental Conditions for Transport and Storage

Condition	Range
Temperature	-40°F to 158°F (-40°C to 70°C)
Relative Humidity	95% non-condensing
Pressure	50 kPa to 106 kPa

Environmental Conditions for Use

Condition	Range
Temperature	50°F to 95°F (10°C to 35°C) ambient temperature
Relative Humidity Range	20% to 85% non-condensing
Atmospheric Pressure	70 kPa to 106 kPa

Nurse Call Connection Requirements

For information about the Nurse Call connection requirements, refer to the *SideCom® Communication System Design and Application Manual* (ds059).

Electrical Description

AC Power Requirements

Nominal Power Distribution Voltage (Volts)	Nominal Power Distribution Frequency (Hertz)	Maximum Equipment Current (Amps)
120 (P3200)	60	6.0[a]
100/110/115/120/127 (P3201)	50/60	6.0
220/230/240 (P3201)	50/60	3.0

a. North American power supply configuration.

Fuse Specifications

Condition	Range
Battery fuse	250 V, 15 A fast blow, 3AB
Mains fuse (100/110/115/120/127 V models)	125 V~, 5 A time delay, 5 x 20 mm (2 each), UL 198G Slo-Blo®[a]
Mains fuse (220/230/240 V models)	250 V~, 2.5 A, time delay, 5 x 20 mm (2 each), IEC
Transformer Secondary #1	250 V~, 20 A, Slo-Blo®, 3AB

a. Slo-Blo® is a registered trademark of Littelfuse, Inc.

Regulations, Standards, and Codes

For VersaCare™ Bed regulations, standards and codes, see table 1-2 on page 1-7.

Table 1-2. Classification and Standards:

Technical and Quality Assurance Standards	UL 60601-1 CSA®[a] C22.2 No. 601.1 IEC 60601-2-38 EN 60601-1 IEC 60601-1-4 EN ISO 9001 and EN 13485

Equipment Classification per IEC 60601-1	Type B
Degree of Protection Against Electric Shock	Class I equipment, internally powered equipment
Classification according to Directive 93/42/EEC	Class I, Class IIa for treatment
Degree of Protection Against Ingress of Water	IPX4
Degree of Protection Against the Presence of Flammable Anaesthetic Mixtures	Not for use with flammable anaesthetics
Mode of Operation	Continuous operation with intermittent loading, 3 minutes ON/30 minutes OFF
Sound Level (measured 1 meter from patient's ear)	< 52 dBA < 73 dBA with IntelliDrive® Transport System active

a. CSA® is a registered trademark of Canadian Standards Association, Inc.

Mattress Flammability

- The sleep surface mattress meets the following specifications:
- CAL TB-117, *Requirements, Test Procedure and Apparatus for Testing the Flame Retardance of Resilient Filling Materials Used in Upholstered Furniture* (foam)
- 16 CFR 1632, *Standard for the Flammability of Mattresses and Mattress Pads*
- CAL TB-129, *Flammability Test Procedures for Mattresses for Use in Public Buildings* (models with fire barrier only)
- BFD IX-II, *Boston Fire Department Mattress Fire Test*

European Mattress Flammability Codes

Condition	Range
P3251A and P3250EA	BS 7177: 1996, Specification for Resistance to Ignition of Mattresses, Divans and Bed Bases **(Surfaces Only)**
	BS 5852: 1990, Assessment of Ignitability of Upholstered Seating by Smouldering and Flaming Ignition Sources **(Surfaces and Siderail Coverings Only)**
	BS EN 597-1: 1995, Furniture - Assessment of the Ignitability of Mattresses and Upholstered Bed Bases; Part 1: Ignition Source: Smouldering Cigarette **(Surfaces and Siderail Coverings Only)**
	BS EN 597-2: 1995, Furniture - Assessment of the Ignitability of Mattresses and Upholstered Bed Bases; Part 2: Ignition Source: Match Flame Equivalent **(Surfaces and Siderail Coverings Only)**
	BS 6807: 1996, Methods of Test for Assessment of the Ignitability of Mattresses, Upholstered Divans and Upholstered Bed Bases with Flaming Types of Primary and Secondary Sources of Ignition **(Surfaces and Siderail Coverings Only)**

Electromagnetic Emissions Guidance

Guidance and Manufacturer's Declaration—Electromagnetic Emissions
The VersaCare™ Bed model P3200/P3201 is intended for use in the electromagnetic environment specified below. The customer or the user of the model P3200/P3201 should make sure it is used in such an environment.

Emissions Test	Compliance	Electromagnetic Environment—Guidance
RF emissions CISPR 11	Group 1	The model P3200/P3201 uses RF energy only for its internal functions. Therefore, its RF emissions are low and are not likely to cause any interference in nearby electronic equipment.
RF Emissions CISPR 11	Class A	The model P3200/P3201 is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic Emissions IEC 61000-3-2	Not Applicable	
Voltage Fluctuations/ Flicker Emissions IEC 61000-3-3	Not Applicable	

Electromagnetic Immunity Guidance

Guidance and Manufacturer's Declaration - Electromagnetic Emissions
The VersaCare™ Bed model P3200/P3201 is intended for use in the electromagnetic environment specified below. The customer or the user of the model P3200/P3201 should make sure it is used in such an environment.

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment—Guidance
Electrostatic Discharge (ESD) IEC 61000-4-2	± 6 kV Contact ± 8 kV Air	± 6 kV Contact ± 8 kV Air	Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Radiated RF IEC 61000-4-3	3 Vrms 80 MHz to 2.5 GHz	3 Vrms 80 MHz to 2.5 GHz	Portable and mobile RF communications equipment should not be used at close distances to the P3200/P3201 bed. (See Note 2)
Electrical Fast Transient/Burst IEC 61000-4-4	± 2 kV on Power Supply Lines ± 1 kV on Input/ Output Lines	± 2 kV on Power Supply Lines ± 1 kV on Input/Output Lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	± 1 kV Differential Mode (line-line) ± 2 kV Common Mode (Line-Ground)	± 1 kV Differential Mode (line-line) ± 2 kV Common Mode (Line-Ground)	Mains power quality should be that of a typical commercial or hospital environment.
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms 150 kHz to 80 MHz	Portable and mobile RF communications equipment (cell phones) should not be used at close distances to the P3200/P3201 bed. (See Note 2)
Power Frequency Magnetic Fields IEC 61000-4-8	3 A/m	3 A/m	The power frequency magnetic field should be measured in the intended installation location to assure it is sufficiently low.
Voltage Dips, Short Interrupts, and Variations On Power Supply Lines IEC 61000-4-11	< 5% U_T (95% dip in U_T for 0.5 cycles) < 40% U_T (60% dip in U_T for 5 cycles) < 70% U_T (30% dip in U_T for 25 cycles) < 5% U_T (95% dip in U_T for 5 seconds) (See Note 1)	< 5% U_T (95% dip in U_T for 0.5 cycles) < 40% U_T (60% dip in U_T for 5 cycles) < 70% U_T (30% dip in U_T for 25 cycles) < 5% U_T (95% dip in U_T for 5 seconds)	Mains power quality should be that of a typical commercial or hospital environment. If operation is required during an extended power outage or interruption, the model P3200/P3201 should be switched to operate from the backup battery.
Note 1: U_T is the AC mains voltage prior to application of the test level.			

Guidance and Manufacturer's Declaration - Electromagnetic Emissions The VersaCare™ Bed model P3200/P3201 is intended for use in the electromagnetic environment specified below. The customer or the user of the model P3200/P3201 should make sure it is used in such an environment.			
Immunity Test	**IEC 60601 Test Level**	**Compliance Level**	**Electromagnetic Environment—Guidance**
Note 2: The compliance levels in the ISM frequency range 150 kHz to 2.5 GHz are intended to decrease the likelihood that mobile/portable communications equipment could cause interference if it is inadvertently brought into the patient area. However, emission limits, IEC 60601 test levels, and tests specified in IEC 60601-1-2:2001 do not address electromagnetic compatibility of electrical equipment at very close distances. Care should always be exercised when using any electrical or RF equipment in the immediate patient area.			

Model Identification

For VersaCare™ Bed model identification, see table 1-3 on page 1-11.

Table 1-3. Model Identification

Model Number	Description
P3200 and P3201	VersaCare™ Bed

Safety Tips

WARNING:
Only facility-authorized personnel should service the VersaCare™ Bed. Servicing by unauthorized personnel could result in personal injury or equipment damage.

WARNING:
Adhere to appropriate infection control policies. Failure to do so could result in the spread of infection.

WARNING:
Do not work under an unsupported load. Install appropriate temporary supports. Failure to do so could result in personal injury or equipment damage.

WARNING:
Wear protective gloves. Failure to do so could result in personal injury.

WARNING:
Wear eye protection. Failure to do so could result in eye injury.

WARNING:
If battery fluid touches skin or clothing, immediately wash it off with clean water. If battery fluid c gets in the eyes, immediately flush them with water and consult a physician. Failure to do so could result in personal injury.

WARNING:
Use extreme care when removing the mattress retaining strap. Failure to do so can cause injury as the strap snaps out of the retainers.

WARNING:
Turn the circuit breaker to the **Off** position. Failure to do so could result in personal injury or equipment damage.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

SHOCK HAZARD:
Do not expose the bed to excessive moisture. Personal injury or equipment damage could occur.

SHOCK HAZARD:
High voltage is present. Use extreme care, or personal injury could occur.

SHOCK HAZARD:
The potential for electrical shock exists with electrical equipment. Establish policies and procedures to educate your staff on the risks associated with electrical equipment.

CAUTION:
Do not use harsh cleaners, solvents, or detergents. Equipment damage could occur.

CAUTION:
Do not use silicone-based lubricants. Equipment damage could occur.

CAUTION:
To prevent component damage, ensure that your hands are clean, and **only** handle the P.C. board by its edges.

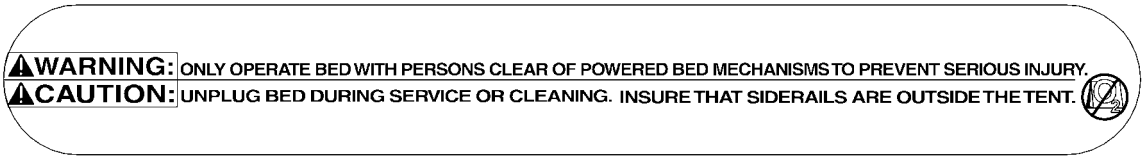
CAUTION:
When handling electronic components, wear an antistatic strap. Failure to do so could result in component damage.

CAUTION:
For shipping and storage, place the removed P.C. board in an antistatic protective bag. Equipment damage can occur.

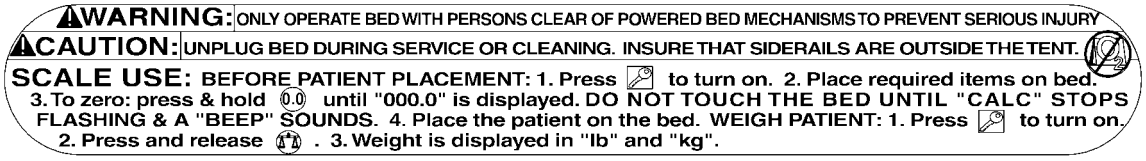
CAUTION:
Make sure the vent holes are clear. Failure to do so could result in overheating and equipment damage.

CAUTION:
Use care when disconnecting the hose from the fitting. Excessive force can damage the fitting.

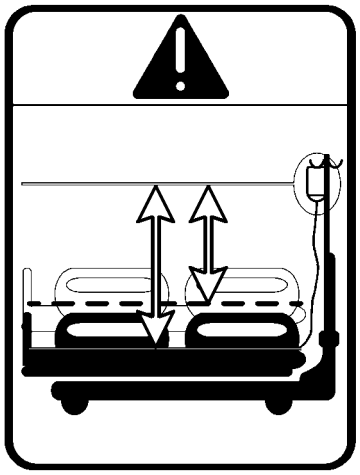
Warning and Caution Labels


WARNING: ONLY OPERATE BED WITH PERSONS CLEAR OF POWERED BED MECHANISMS TO PREVENT SERIOUS INJURY.
CAUTION: UNPLUG BED DURING SERVICE OR CLEANING. INSURE THAT SIDERAILS ARE OUTSIDE THE TENT.

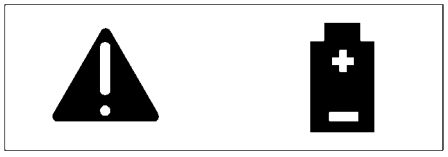
7082501 Siderail Warning


WARNING: ONLY OPERATE BED WITH PERSONS CLEAR OF POWERED BED MECHANISMS TO PREVENT SERIOUS INJURY
CAUTION: UNPLUG BED DURING SERVICE OR CLEANING. INSURE THAT SIDERAILS ARE OUTSIDE THE TENT.
SCALE USE: BEFORE PATIENT PLACEMENT: 1. Press to turn on. 2. Place required items on bed.
3. To zero: press & hold 0.0 until "000.0" is displayed. DO NOT TOUCH THE BED UNTIL "CALC" STOPS
FLASHING & A "BEEP" SOUNDS. 4. Place the patient on the bed. WEIGH PATIENT: 1. Press to turn on.
2. Press and release . 3. Weight is displayed in "lb" and "kg".

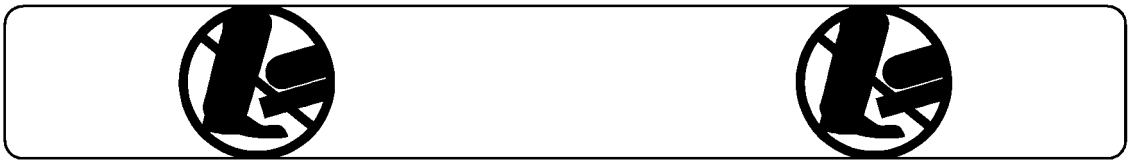
7082502 Siderail Warning with Scale operation instructions



128815 IV Pole Warning



66870 Battery Warning



127866 Foot Warning

m333_259

NOTES:

Chapter 2
Troubleshooting Procedures

2

Getting Started

WARNING:
Only facility-authorized personnel should service the VersaCare™ Bed. Servicing by unauthorized personnel could result in personal injury or equipment damage.

Begin each procedure in this chapter with step 1. Follow the sequence outlined (each step assumes the previous step has been completed). In each step, the normal operation of the product can be confirmed by answering **Yes** or **No** to the statement. Your response will lead to another step in the procedure, a repair analysis procedure (RAP), or a component replacement. If more than one component is listed, replace them in the given order.

To begin gathering information about the problem, start with **Initial Actions**.

To isolate or identify a problem and to verify the repair after completing each corrective action (replacing or adjusting a part, seating a connector, etc.), perform the **Function Checks**.

To verify the repair, perform the **Final Actions** after the Function Checks.

If troubleshooting procedures do not isolate the problem, call Hill-Rom Technical Support at (800) 445-3720 for assistance.

Initial Actions

Use Initial Actions to gather information from operators concerning problems with the VersaCare™ Bed. Note the symptoms or other information concerning the problem that the operator describes. This information helps identify the probable cause.

1. Someone who can explain the problem is available.

   Yes **No**
   ↓ → Go to "Function Checks" on page 2-6.

2. Ask this person to demonstrate or explain the problem. The problem can be duplicated.

   Yes **No**
   ↓ → Go to "Function Checks" on page 2-6.

3. The problem is a result of improper operator action.

   Yes **No**
   ↓ → Refer to "Rapid Problem/Solution Identification Tables" on page 2-3, **or** go to "Function Checks" on page 2-6.

4. Instruct the operator to refer to the procedures in the VersaCare™ Bed User Manual. Do the "Function Checks" to make sure the VersaCare™ Bed works correctly.

Rapid Problem/Solution Identification Tables

If the Service Required indicator is flashing or solid, use the following table to identify the appropriate troubleshooting procedure (see table 2-1 on page 2-3).

Table 2-1. Flashing or Solid Service Required LED

Long Flash	Short Flash	Description	Solution
1	2	Mattress Disconnected	Go to RAP 2.27 on page 2-39.
1	3	Head Angle Sensor Error	Go to RAP 2.28 on page 2-40.
1	5	Head FSR1 and FSR2	Go to RAP 2.29 on page 2-41.
2	2	Accumulator Pressure	Go to RAP 2.30 on page 2-42.
2	3	ErRor Detected In Dynamic Air Module	Replace Air Module
2	6	Missing 24 VDC Input	Go to RAP 2.31 on page 2-43.
3	1	Not Reaching Head Zone Pressure	Go to RAP 2.32 on page 2-44.
3	2	Not Reaching Seat Zone Pressure	Go to RAP 2.33 on page 2-45.
3	3	Not Reaching Foot Zone Pressure	Go to RAP 2.34 on page 2-46.
3	4	Not Reaching Right Turn Assist Pressure	Go to RAP 2.35 on page 2-47.
3	5	Not Reaching Left Turn Assist Pressure	Go to RAP 2.36 on page 2-48.
4	2	Scale Error	Go to RAP 2.37 on page 2-49 through RAP 2.41 on page 2-53.
4	3	Scale Error	Go to RAP 2.37 on page 2-49 through RAP 2.41 on page 2-53.
4	4	Scale Error	Go to RAP 2.37 on page 2-49 through RAP 2.41 on page 2-53.
Solid			Go to RAP 2.1 on page 2-13.

If the scale/PPM display is showing an error or will not arm, use the following table to identify the appropriate troubleshooting procedure (see table 2-2 on page 2-4).

Table 2-2. Scale/PPM Display Errors

Error	Solution
Err0	Go to RAP 2.37 on page 2-49.
Err1	Go to RAP 2.38 on page 2-50.
Err2	Go to RAP 2.39 on page 2-51.
Err3	Go to RAP 2.40 on page 2-52.
Err4	Go to RAP 2.41 on page 2-53.
Err5	Go to RAP 2.41 on page 2-53.
PPM will not arm, with scale display	Go to RAP 2.43 on page 2-55.
PPM will not arm, no scale display	Go to RAP 2.44 on page 2-56.
CRC	Go to RAP 2.45 on page 2-57.

For malfunctions not displayed on the scale/PPM display or when the Service Required indicator illuminates, use the following table to identify the appropriate troubleshooting procedure (see table 2-3 on page 2-4).

Table 2-3. Miscellaneous Malfunctions

Error	Solution
Motors Do Not Operate	Go to RAP 2.16 on page 2-28.
No AC Power	Go to RAP 2.17 on page 2-29.
AC Power, No Motor Power	Go to RAP 2.18 on page 2-30.
No DC Power	Go to RAP 2.19 on page 2-31.
Power Supply P.C. Board Error Codes	Go to RAP 2.20 on page 2-32.
Siderail Detection Switch Without SideCom® Communication System	Go to RAP 2.22 on page 2-34.
Siderail Detection Switch With SideCom® Communication System	Go to RAP 2.23 on page 2-35.
Patient Pendant	Go to RAP 2.46 on page 2-58.
Bed not down indicator flashing	Go to RAP 2.47 on page 2-59.

For IntelliDrive® Transport System errors, use the following table to identify the appropriate troubleshooting procedure (see table 2-4 on page 2-5).

Table 2-4. IntelliDrive® Transport System

Error	Solution
Bed Will Not Drive	Go to RAP 2.48 on page 2-60.
Bed Will Not Drive, Wheel Is Down	Go to RAP 2.49 on page 2-61.
Wheel Will Not Stow	Go to RAP 2.50 on page 2-62.
Battery Check	Go to RAP 2.51 on page 2-63.
Steer Switch Check	Go to RAP 2.52 on page 2-64.
PACM Board Power Check	Go to RAP 2.53 on page 2-65.
PACM Board Deployment Check	Go to RAP 2.54 on page 2-66.
PACM Board Drive Check	Go to RAP 2.55 on page 2-67.
Motor Check	Go to RAP 2.56 on page 2-68.
PACM to Junction Board Cable Check	Go to RAP 2.57 on page 2-69.
Handle Enable Switch Check	Go to RAP 2.58 on page 2-70.
Throttle Check	Go to RAP 2.59 on page 2-71.
Handle Gauge Check	Go to RAP 2.60 on page 2-72.
Controller Check	Go to RAP 2.63 on page 2-75.
Visual Inspection	Go to RAP 2.64 on page 2-77.
Junction Board Debugging	Go to RAP 2.65 on page 2-78.

Function Checks

1. The "Initial Actions" have been performed.

   Yes **No**
   ↓ → Go to “Initial Actions” on page 2-2.

2. Operate the trendelenburg function.

   This function works.

   Yes **No**
   ↓ → Go to RAP 2.1 on page 2-13 **or** go to RAP 2.16 on page 2-28.

3. Lock out the head, knee, hilow, and Master controls.

   The corresponding INDICATOR illuminates.

   Yes **No**
   ↓ → Go to RAP 2.1 on page 2-13 **or** go to RAP 2.16 on page 2-28.

4. Unlock the head, knee, hilow, and Master controls.

   The corresponding INDICATOR goes out.

   Yes **No**
   ↓ → Go to RAP 2.1 on page 2-13.

5. Press the *Bed Up* control of the hilow function.

   The bed rises to the high position without stopping.

   Yes **No**
   ↓ → Go to RAP 2.1 on page 2-13 **or** go to RAP 2.16 on page 2-28.

6. Press the *Bed Down* control of the hilow function.

   The bed goes down to the low position without stopping. In addition, the Bed Not Down INDICATOR goes off when the bed reaches the maximum low position.

   Yes **No**
   ↓ → Go to RAP 2.1 on page 2-13 **or** go to RAP 2.16 on page 2-28.

7. Press the *Knee Up* control of the knee section function.

   The knee section rises to the high position without stopping or the audible alarm sounding during the movement.

   Yes **No**
   ↓ → Go to RAP 2.1 on page 2-13 **or** go to RAP 2.16 on page 2-28.

8. Press the *Knee Down* control of the knee section function.

The knee section goes down to the low position without stopping.

Yes **No**
↓ → Go to RAP 2.1 on page 2-13 **or** go to RAP 2.16 on page 2-28.

9. Press the *Head Up* control of the head section function.

   The head section rises to the high position without stopping.

   Yes **No**
   ↓ → Go to RAP 2.1 on page 2-13 **or** go to RAP 2.16 on page 2-28.

10. Press the *Head Down* control of the head section function.

    The head section goes down to the low position without stopping.

    Yes **No**
    ↓ → Go to RAP 2.1 on page 2-13 **or** go to RAP 2.16 on page 2-28.

11. Press the patient *Head Up* control.

    The head section and knee section rise simultaneously, then the knee section stops at an angle approaching 16° while the head section continues to rise to its highest position.

    Yes **No**
    ↓ → Go to RAP 2.1 on page 2-13 **or** go to RAP 2.16 on page 2-28.

12. Press the patient *Head Down* control.

    The head section goes down, and the knee section lowers simultaneously until it reaches the lowest position while the head section reaches low position.

    Yes **No**
    ↓ → Go to RAP 2.1 on page 2-13 **or** go to RAP 2.16 on page 2-28.

13. Unplug the bed, activate the battery backup, and test the functions checked in step 10 to step 12.

    The bed works correctly.

    Yes **No**
    ↓ → Go to RAP 2.19 on page 2-31.

14. Press the *Foot Extension* control

    The foot section extends to the full out position without stopping.

    Yes **No**
    ↓ → Go to RAP 2.1 on page 2-13 **or** go to RAP 2.16 on page 2-28.

15. Press the *Foot Retraction* control.

    The foot section retracts to the full in position without stopping.

    Yes **No**
    ↓ → Go to RAP 2.1 on page 2-13 **or** go to RAP 2.16 on page 2-28.

16. Press the *Chair Position* control.

    The head section and knee section sections rise as long as the control is pressed until the required position is reached and the foot section lowers.

    Yes **No**
    ↓ → Go to RAP 2.1 on page 2-13 **or** go to RAP 2.16 on page 2-28.

17. Press the *Chair Out* control.

    The head section, knee section and foot section sections gradually return to the horizontal as long as the control is pressed.

    Yes **No**
    ↓ → Go to RAP 2.1 on page 2-13 **or** go to RAP 2.16 on page 2-28.

18. Raise the bed until the intermediate position is reached. Operate the *Trendelenburg* control.

    The sleep surface gradually tilts to maximum trendelenburg without any problem or abnormal noise.

    Yes **No**
    ↓ → Go to RAP 2.1 on page 2-13 **or** go to RAP 2.16 on page 2-28.

19. Operate the *Reverse Trendelenburg* control.

    The sleep surface gradually tilts to maximum reverse trendelenburg without any problem or abnormal noise.

    Yes **No**
    ↓ → Go to RAP 2.1 on page 2-13 **or** go to RAP 2.16 on page 2-28.

20. Press the *Head Up* control until the section reaches high position.

NOTE:
Someone should be lying on the bed so that this test can be carried out conclusively.

Pull each of the CPR handles in turn.

The head section descends quickly up to the mid-travel then the movement is cushioned until the low position is reached. The movement occurs without any problem or abnormal noise.

Yes **No**
↓ → Go to RAP 2.1 on page 2-13 **or** go to RAP 2.16 on page 2-28.

21. Continue to hold the CPR handle.

    The bed continues into the Trendelenburg position.

    Yes **No**
    ↓ → Go to RAP 2.1 on page 2-13 or go to RAP 2.16 on page 2-28.

22. Release the CPR handles and operate the head section up to check that the head section motor drive mechanism is working correctly.

    The head section rises without any problem or abnormal noise.

    Yes **No**
    ↓ → Go to RAP 2.1 on page 2-13 **or** go to RAP 2.16 on page 2-28.

23. Set the brakes. Try to move the bed.

    The four wheels are locked and prevent any movement.

    Yes **No**
    ↓ → Replace affected caster.

24. Set the brake/steer pedal to the Steer position and trigger the lengthways locking of the steer caster (non-IntelliDrive® Transport System beds).

    The caster locks in the expected position.

    Yes **No**
    ↓ → Replace affected caster.

25. Go to “Final Actions” on page 2-12.

Treatment Surface Function Check

1. Press the **Max-inflate** control on the intermediate siderail. After 30 seconds, wipe your hand across the mattress.

Verify that the three zones are inflated to a high pressure.

Yes **No**
↓ → Go to RAP 2.24.

2. Press the Pressure Relief mode.

The Pressure Relief mode is active.

Yes **No**
↓ → Go to RAP 2.24.

3. Articulate the patient surface to the flat position. The three zones are inflated: head, seat, and foot.

Are the three zones inflated.

Yes **No**
↓ → Go to RAP 2.24.

4. Squeeze and hold pressure on the head section.

The head section deflates slightly within 30 seconds.

Yes **No**
↓ → Go to RAP 2.24.

5. Release the pressure in the head section.

The applicable head section inflates slightly within 30 seconds.

Yes **No**
↓ → Go to RAP 2.24.

6. Articulate the head section to 65°. After 30 seconds, wipe your hand firmly across the air mattress to verify that the head, seat, and foot zones are inflated.

The head zone section has a lower (softer) pressure than the seat zone.

Yes **No**
↓ → Go to RAP 2.24.

7. Make sure the head section is flat, place all four siderails in the up and locked position. Activate the Right Turn Assist control.

The Right Turn Assist bladder inflates and an alarm sounds when one of the right side siderails is lowered.

Yes **No**
↓ → Go to RAP 2.24.

8. Place all four siderails in the up and locked position. Activate the Left Turn Assist control.

The Left Turn Assist bladder inflates and an alarm sounds when one of the left side siderails are lowered.

Yes **No**
↓ → Go to RAP 2.24.

9. Go to "Final Actions" on page 2-12.

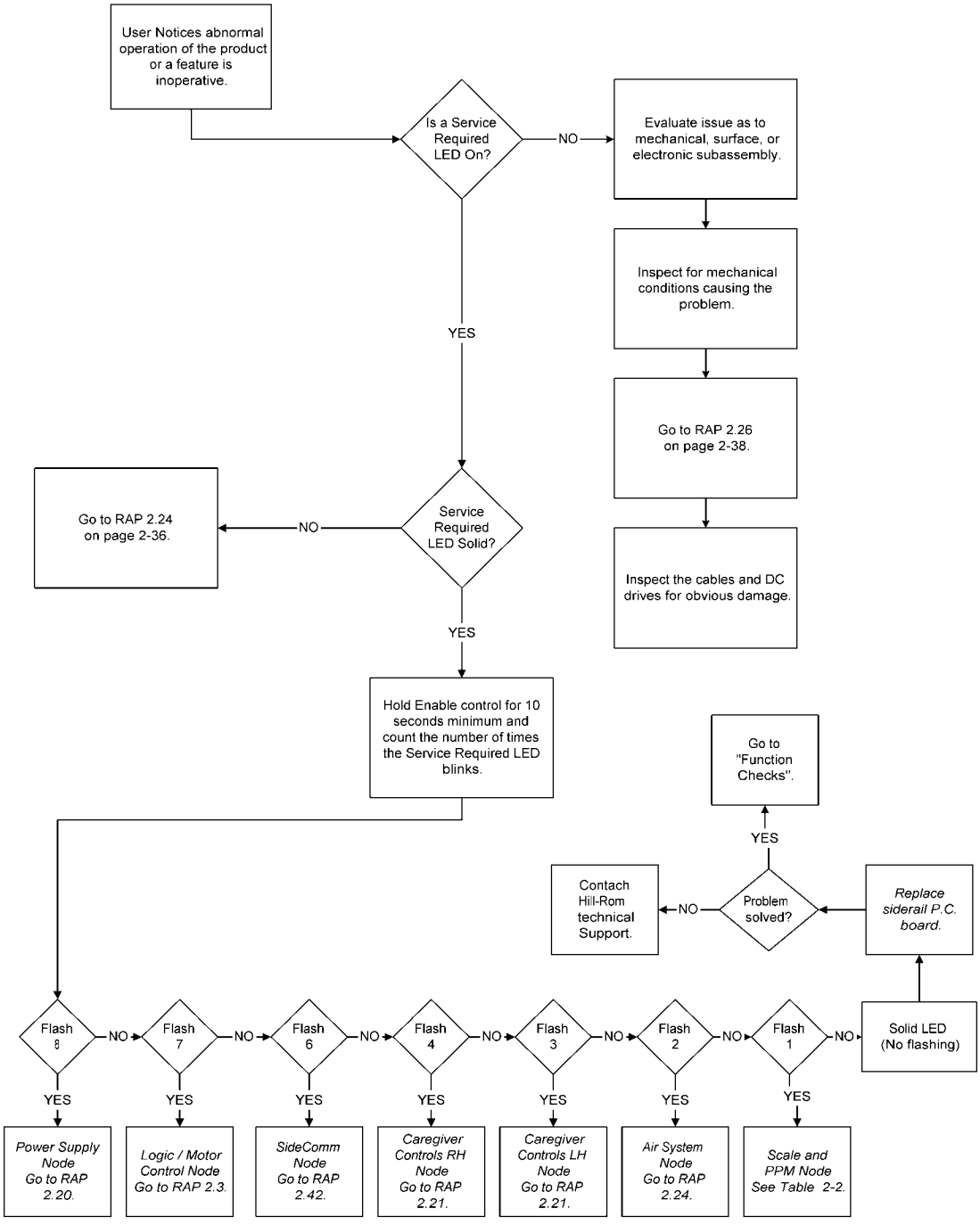
Final Actions

1. Do the required preventative maintenance procedures. See “Preventive Maintenance” on page 6-4.

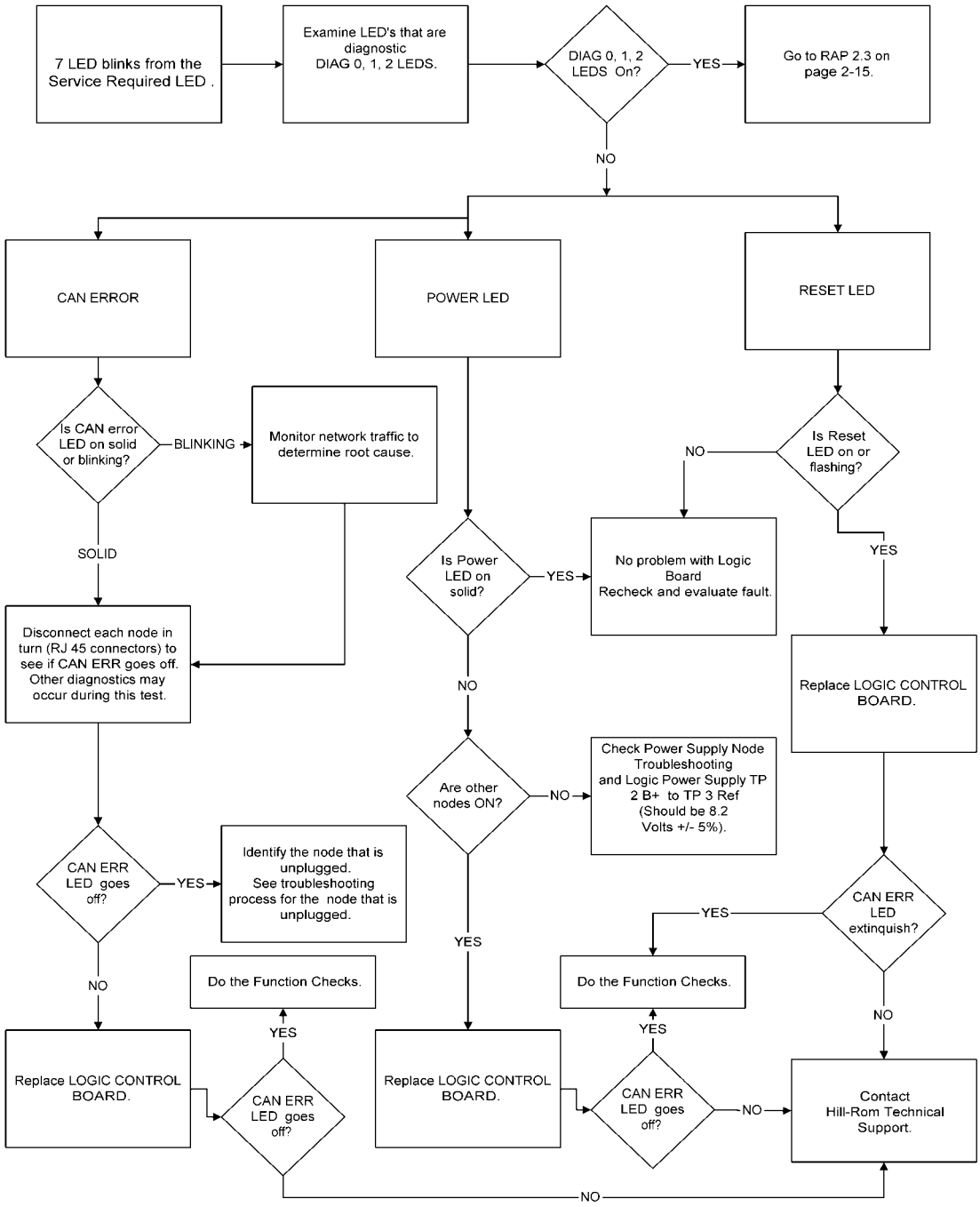
2. Do all required administrative tasks.

2.1 Electronics (Sheet 1 of 2)

2


User Notices abnormal operation of the product or a feature is inoperative.
Is a Service Required LED On?
NO
Evaluate issue as to mechanical, surface, or electronic subassembly.
Inspect for mechanical conditions causing the problem.
Go to RAP 2.26 on page 2-38.
Inspect the cables and DC drives for obvious damage.
YES
Service Required LED Solid?
NO
Go to RAP 2.24 on page 2-36.
YES
Hold Enable control for 10 seconds minimum and count the number of times the Service Required LED blinks.
Go to "Function Checks".
YES
Problem solved?
NO
Contach Hill-Rom technical Support.
Replace siderail P.C. board.
Flash 8
NO
Flash 7
NO
Flash 6
NO
Flash 4
NO
Flash 3
NO
Flash 2
NO
Flash 1
NO
Solid LED (No flashing)
YES
Power Supply Node Go to RAP 2.20.
Logic / Motor Control Node Go to RAP 2.3.
SideComm Node Go to RAP 2.42.
Caregiver Controls RH Node Go to RAP 2.21.
Caregiver Controls LH Node Go to RAP 2.21.
Air System Node Go to RAP 2.24.
Scale and PPM Node See Table 2-2.

2.2 Electronics (Sheet 2 of 2)

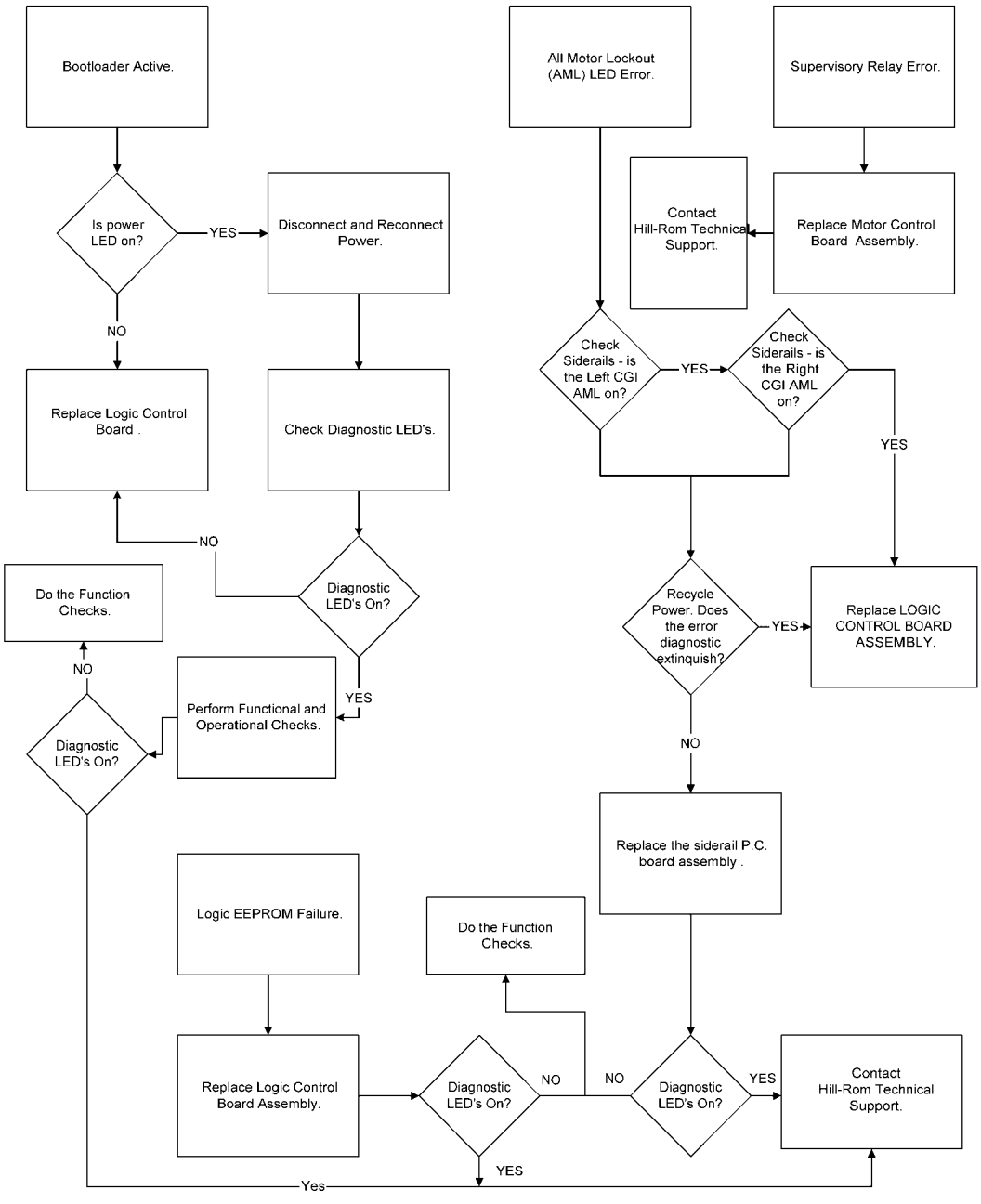

7 LED blinks from the Service Required LED .
Examine LED's that are diagnostic DIAG 0, 1, 2 LEDS.
DIAG 0, 1, 2 LEDS On?
YES
Go to RAP 2.3 on page 2-15.
NO
CAN ERROR
POWER LED
RESET LED
Is CAN error LED on solid or blinking?
BLINKING
Monitor network traffic to determine root cause.
SOLID
Is Reset LED on or flashing?
NO
YES
Is Power LED on solid?
YES
No problem with Logic Board Recheck and evaluate fault.
Disconnect each node in turn (RJ 45 connectors) to see if CAN ERR goes off. Other diagnostics may occur during this test.
NO
Replace LOGIC CONTROL BOARD.
Are other nodes ON?
NO
Check Power Supply Node Troubleshooting and Logic Power Supply TP 2 B+ to TP 3 Ref (Should be 8.2 Volts +/- 5%).
CAN ERR LED goes off?
YES
Identify the node that is unplugged. See troubleshooting process for the node that is unplugged.
CAN ERR LED extinquish?
YES
NO
YES
Do the Function Checks.
Do the Function Checks.
NO
YES
YES
Replace LOGIC CONTROL BOARD.
CAN ERR LED goes off?
Replace LOGIC CONTROL BOARD.
CAN ERR LED goes off?
NO
Contact Hill-Rom Technical Support.
NO

2.3 Logic P.C. Board Diagnostic LED Codes

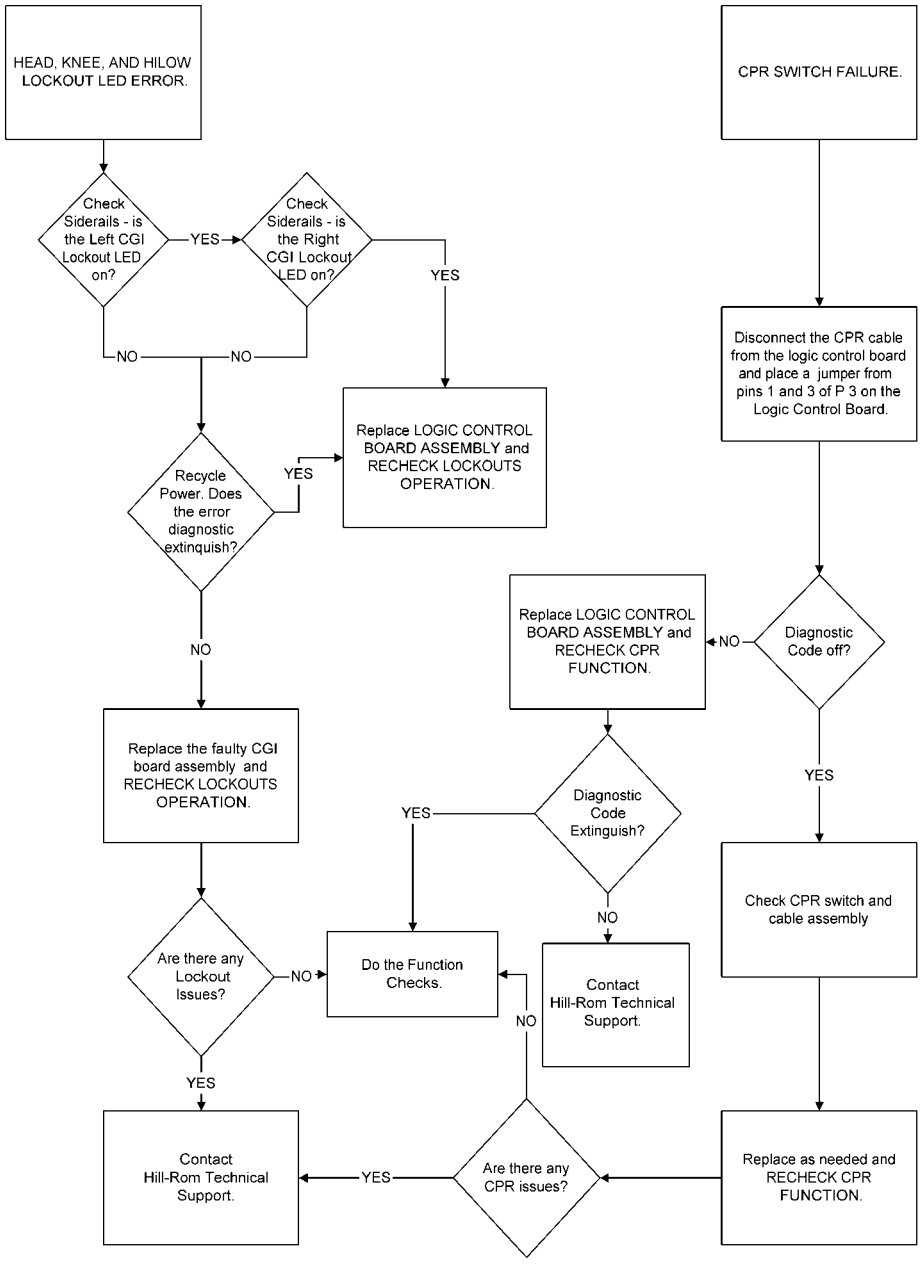
Table 2-5. Logic P.C. Board Diagnostic LED Codes

Error	Red LED	Green LED	Amber LED	Solution
Bootloader	Off	Off	Off	Go to RAP 2.4.
Supervisory Relay Error	Off	Off	Flash	Go to RAP 2.4.
EEPROM Failure	Off	Off	On	Go to RAP 2.4.
All Lockout LED Error	Off	Flash	Off	Go to RAP 2.4.
Head, Knee, Hilow Lockout LED Error	Off	Flash	Flash	Go to RAP 2.5.
CPR Switch Failure	Off	Flash	On	Go to RAP 2.5.
Hilow Head Unexpected Motion	Off	On	Off	Go to RAP 2.6.
Hilow Foot Unexpected Motion	Off	On	Flash	Go to RAP 2.6.
Head Unexpected Motion	Off	On	On	Go to RAP 2.7.
Foot, Knee, Leg Unexpected Motion	Flash	Off	Off	Go to RAP 2.7.
Hilow Head Current Overload	Flash	Off	Flash	Go to RAP 2.8.
Hilow Foot Current Overload	Flash	Off	On	Go to RAP 2.8.
Head Current Overload	Flash	Flash	Off	Go to RAP 2.8.
Knee Current Overload	Flash	Flash	Flash	Go to RAP 2.8.
Foot Current Overload	Flash	Flash	On	Go to RAP 2.8.
Leg Current Overload	Flash	On	Off	Go to RAP 2.8.
Hilow Head Position Rate High	Flash	On	Flash	Go to RAP 2.9.
Hilow Head Position Rate Low	Flash	On	On	Go to RAP 2.10.
Hilow Foot Position Rate High	On	Off	Off	Go to RAP 2.9.
Hilow Foot Position Rate Low	On	Off	Flash	Go to RAP 2.10.
Drive Current Too Low	On	Off	On	Go to RAP 2.11.
Heartbeat Failure	On	Flash	Off	Go to RAP 2.12.
Patient Pendant Failure	On	Flash	Flash	Go to RAP 2.13.
Logic Circuit Failure	On	Flash	On	Go to RAP 2.14.
Unused 1	On	On	Off	
Unused 2	On	On	Flash	
Normal	On	On	On	

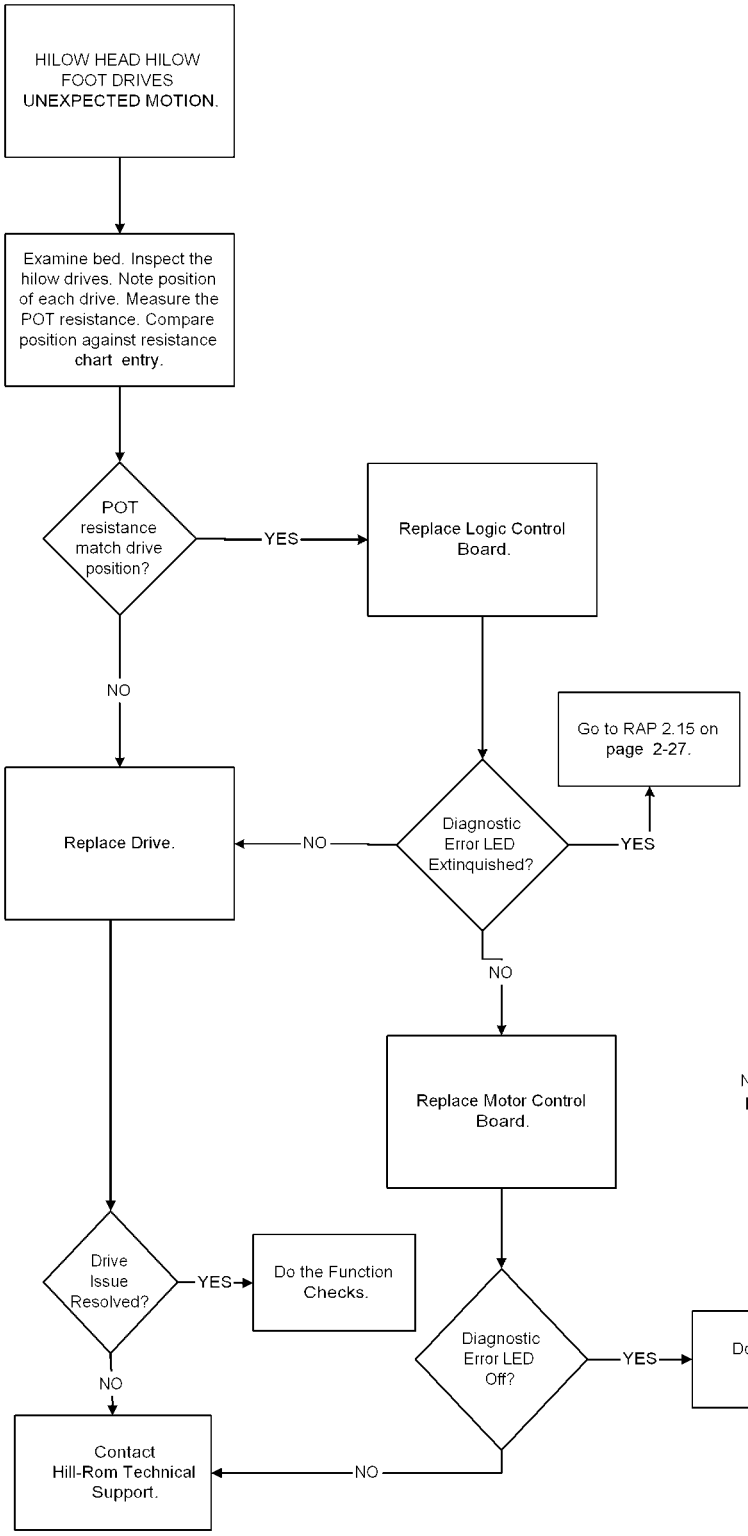
2.4 Bootloader, Supervisory Relay Error, EEPROM Failure, and All Lockout LED Error



2.5 Head, Knee, Hilow Lockout LED Error and CPR Switch Failure


HEAD, KNEE, AND HILOW LOCKOUT LED ERROR.
Check Siderails - is the Left CGI Lockout LED on?
YES
Check Siderails - is the Right CGI Lockout LED on?
YES
NO
NO
Recycle Power. Does the error diagnostic extinquish?
YES
Replace LOGIC CONTROL BOARD ASSEMBLY and RECHECK LOCKOUTS OPERATION.
NO
Replace the faulty CGI board assembly and RECHECK LOCKOUTS OPERATION.
Are there any Lockout Issues?
NO
Do the Function Checks.
YES
Contact Hill-Rom Technical Support.
CPR SWITCH FAILURE.
Disconnect the CPR cable from the logic control board and place a jumper from pins 1 and 3 of P 3 on the Logic Control Board.
Diagnostic Code off?
NO
Replace LOGIC CONTROL BOARD ASSEMBLY and RECHECK CPR FUNCTION.
YES
Diagnostic Code Extinguish?
YES
NO
Check CPR switch and cable assembly
Replace as needed and RECHECK CPR FUNCTION.
Are there any CPR issues?
YES
Contact Hill-Rom Technical Support.
NO

2.6 Hilow Motor Unexpected Motion

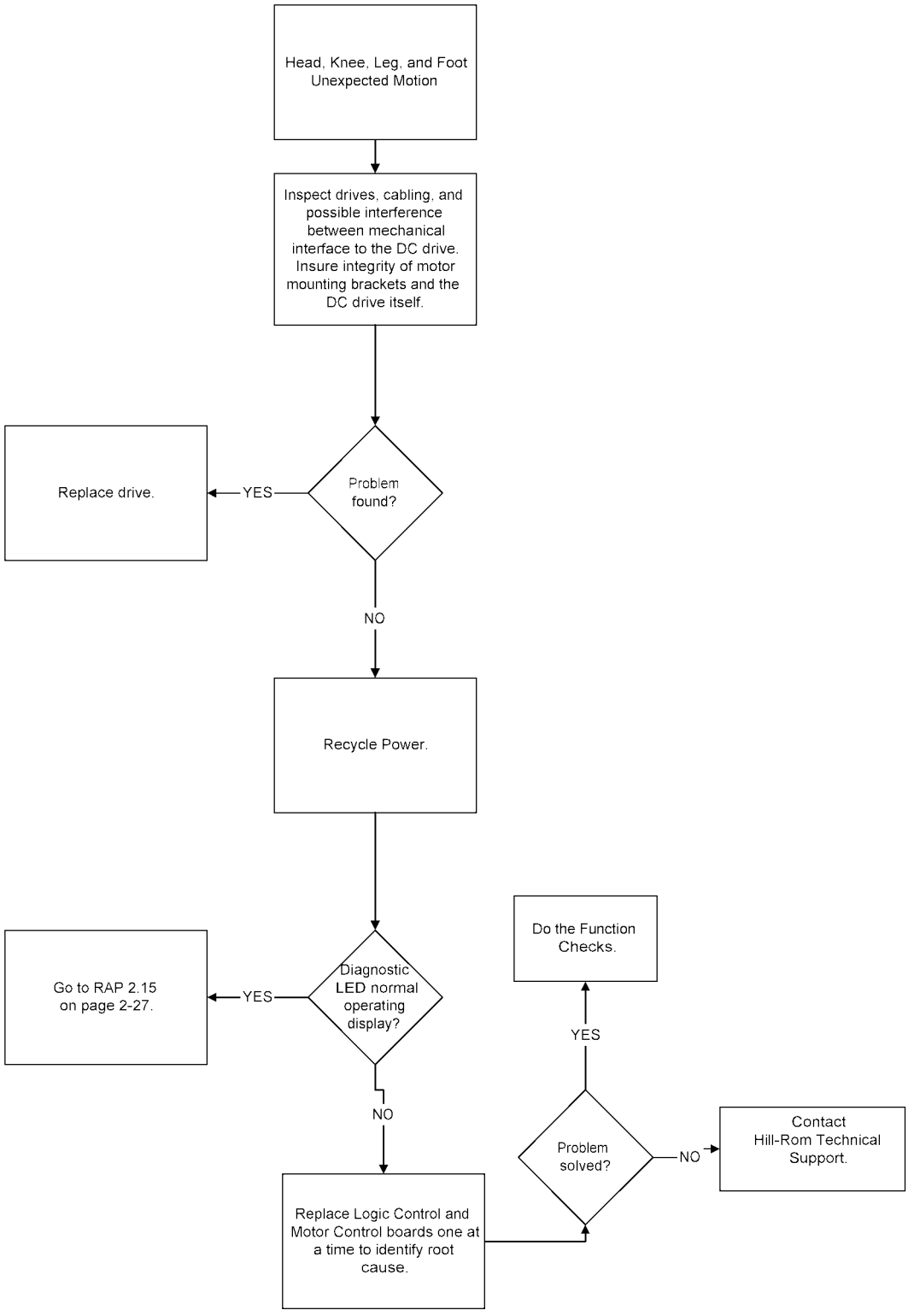


Stroke length of DC Drive
Versus
Resistance of Potentiometer

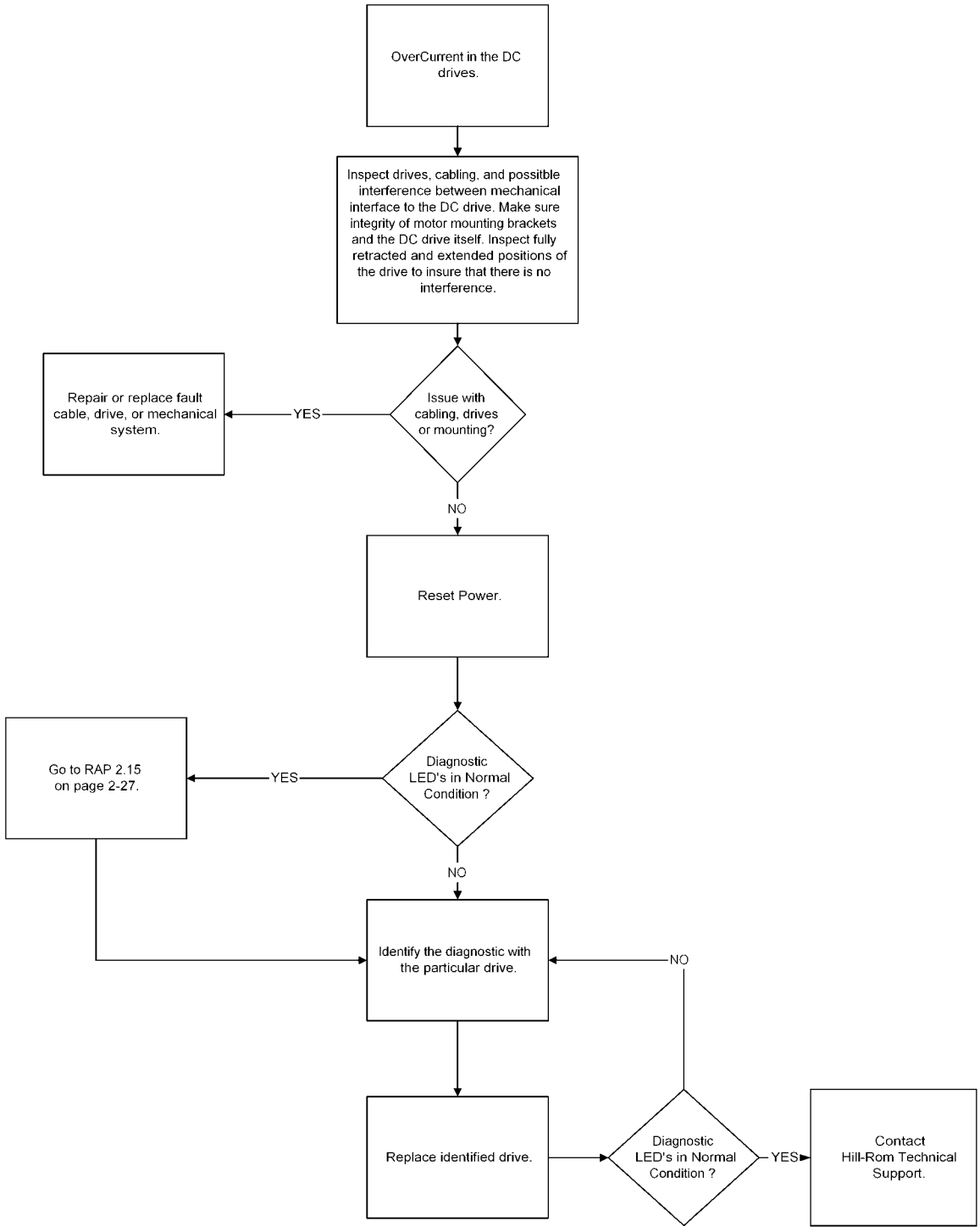
Stroke Length extended	Rx * see note Drive Extension 34.2 ohms /mm 12 mm pitch Values Approx
Fully Retracted position	Add to retracted position reading (10 to 100 Ohms)
1 mm	34.2
11 mm	376.2
21 mm	718.2
31 mm	1060.2
41 mm	1402.2
51 mm	1744.2
61 mm	2086.2
71 mm	2428.2
81 mm	2770.2
91 mm	3112.2
101 mm	3454.2
111 mm	3796.2
121 mm	4138.2
131 mm	4480.2
141 mm	4822.2
151 mm	5164.2
161 mm	5506.2
171 mm	5848.2
181 mm	6190.2

NOTE* : Measured from pin 4 of the motor connector to pin 5. Always check pin 4 to pin 3 for the difference of resistance. This is calculated by
Rx = 10K - reading from pin 4 to 3

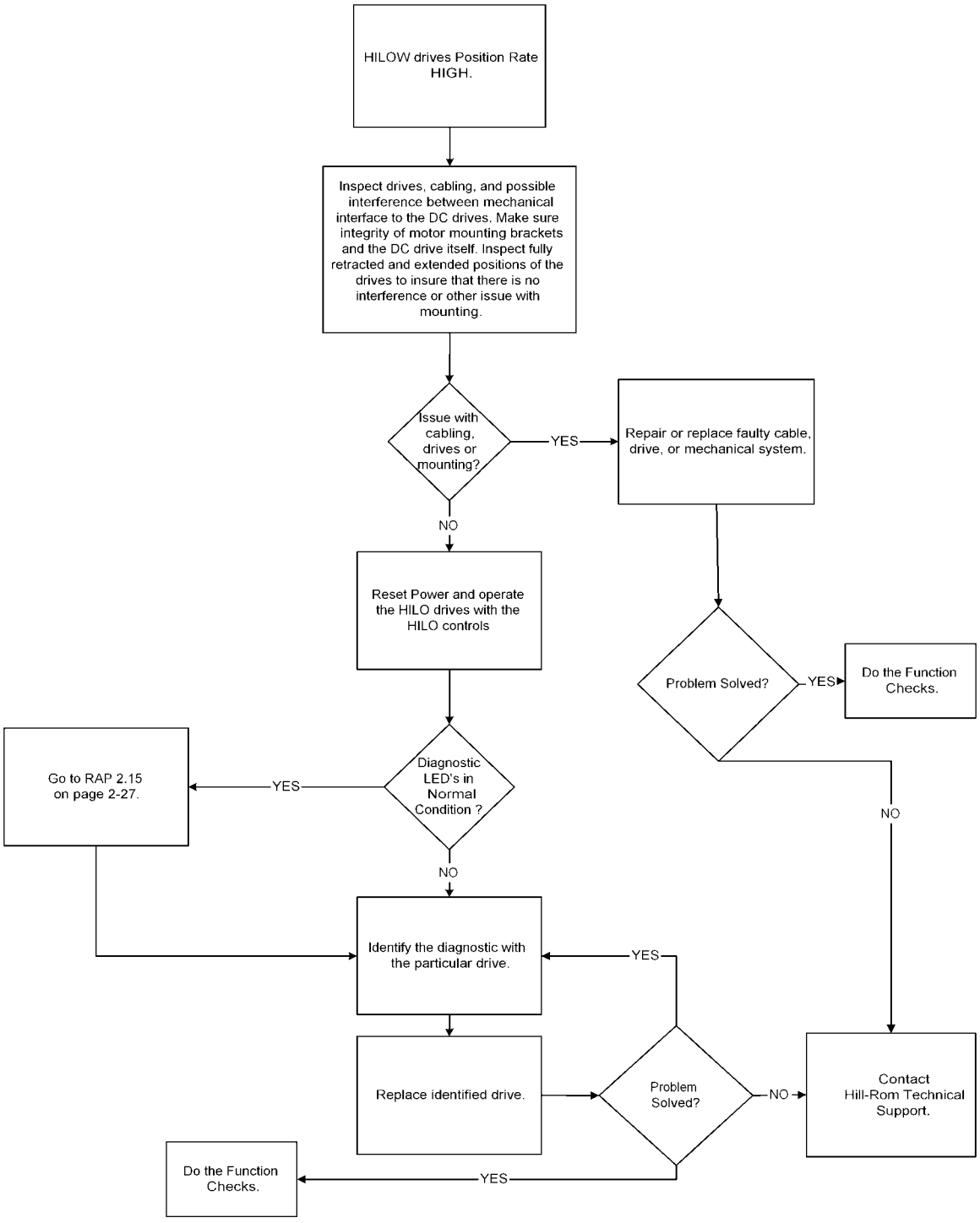
2.7 Head, Knee, Leg, and Foot Motor Unexpected Motion


Head, Knee, Leg, and Foot Unexpected Motion
Inspect drives, cabling, and possible interference between mechanical interface to the DC drive. Insure integrity of motor mounting brackets and the DC drive itself.
Problem found?
YES
Replace drive.
NO
Recycle Power.
Diagnostic LED normal operating display?
YES
Go to RAP 2.15 on page 2-27.
NO
Replace Logic Control and Motor Control boards one at a time to identify root cause.
Problem solved?
NO
Contact Hill-Rom Technical Support.
YES
Do the Function Checks.

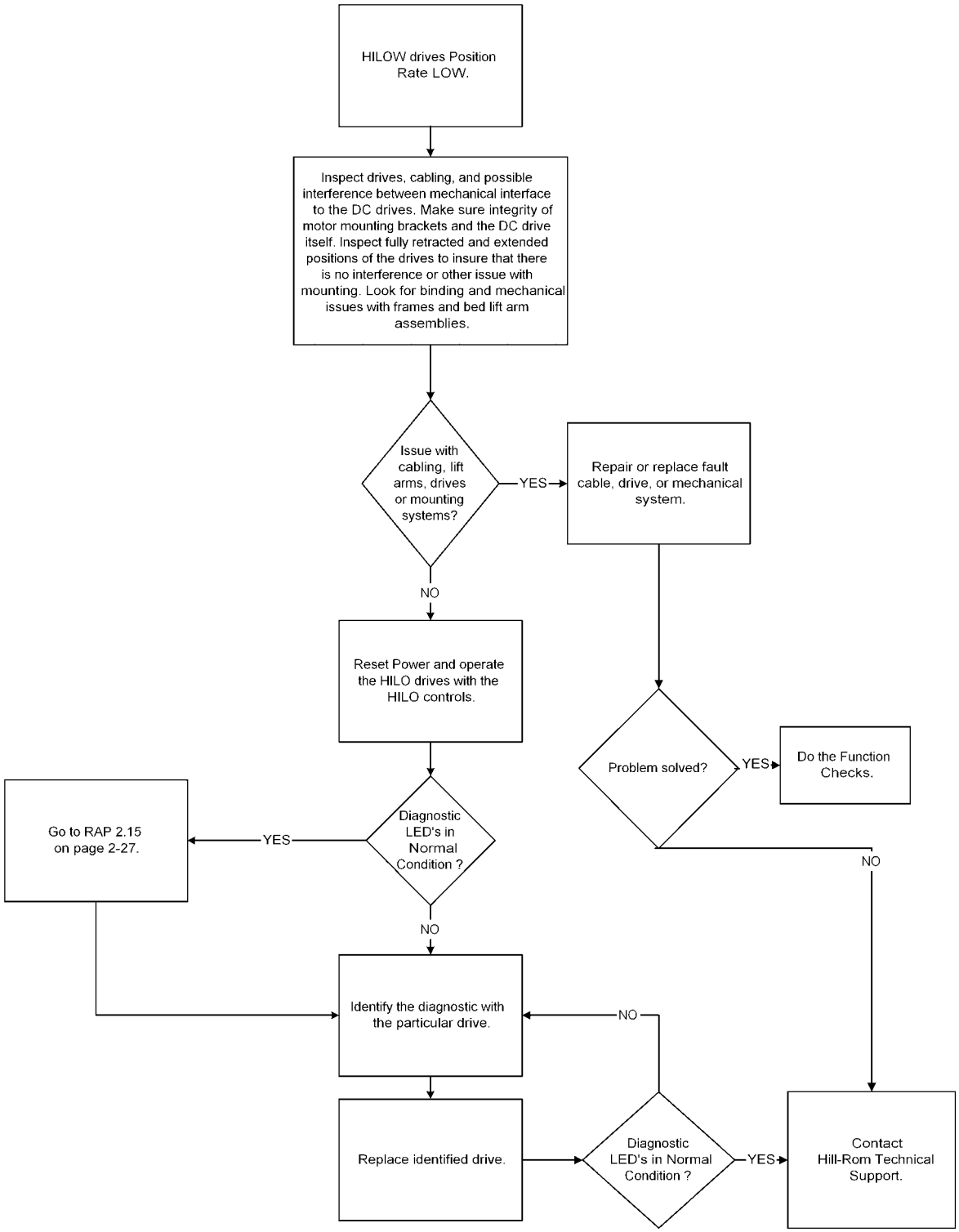
2.8 Motor Overcurrent


OverCurrent in the DC drives.
Inspect drives, cabling, and possitble interference between mechanical interface to the DC drive. Make sure integrity of motor mounting brackets and the DC drive itself. Inspect fully retracted and extended positions of the drive to insure that there is no interference.
Issue with cabling, drives or mounting?
YES
Repair or replace fault cable, drive, or mechanical system.
NO
Reset Power.
Diagnostic LED's in Normal Condition ?
YES
Go to RAP 2.15 on page 2-27.
NO
Identify the diagnostic with the particular drive.
NO
Replace identified drive.
Diagnostic LED's in Normal Condition ?
YES
Contact Hill-Rom Technical Support.

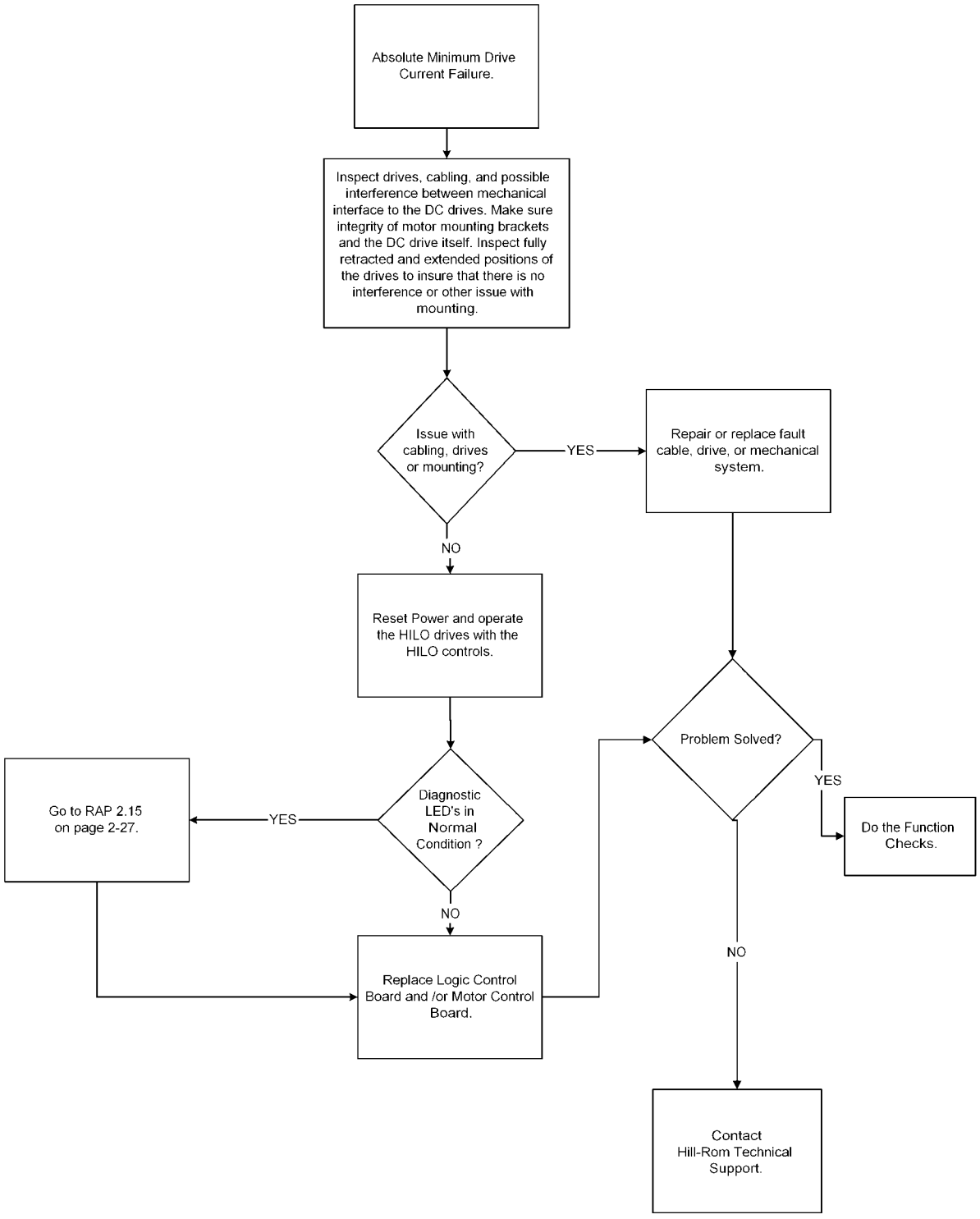
2.9 Hilow Motor Position Rate High


HILOW drives Position Rate HIGH.
Inspect drives, cabling, and possible interference between mechanical interface to the DC drives. Make sure integrity of motor mounting brackets and the DC drive itself. Inspect fully retracted and extended positions of the drives to insure that there is no interference or other issue with mounting.
Issue with cabling, drives or mounting?
YES
Repair or replace faulty cable, drive, or mechanical system.
NO
Reset Power and operate the HILO drives with the HILO controls
Problem Solved?
YES
Do the Function Checks.
NO
Diagnostic LED's in Normal Condition ?
YES
Go to RAP 2.15 on page 2-27.
NO
Identify the diagnostic with the particular drive.
YES
Replace identified drive.
Problem Solved?
NO
Contact Hill-Rom Technical Support.
YES
Do the Function Checks.

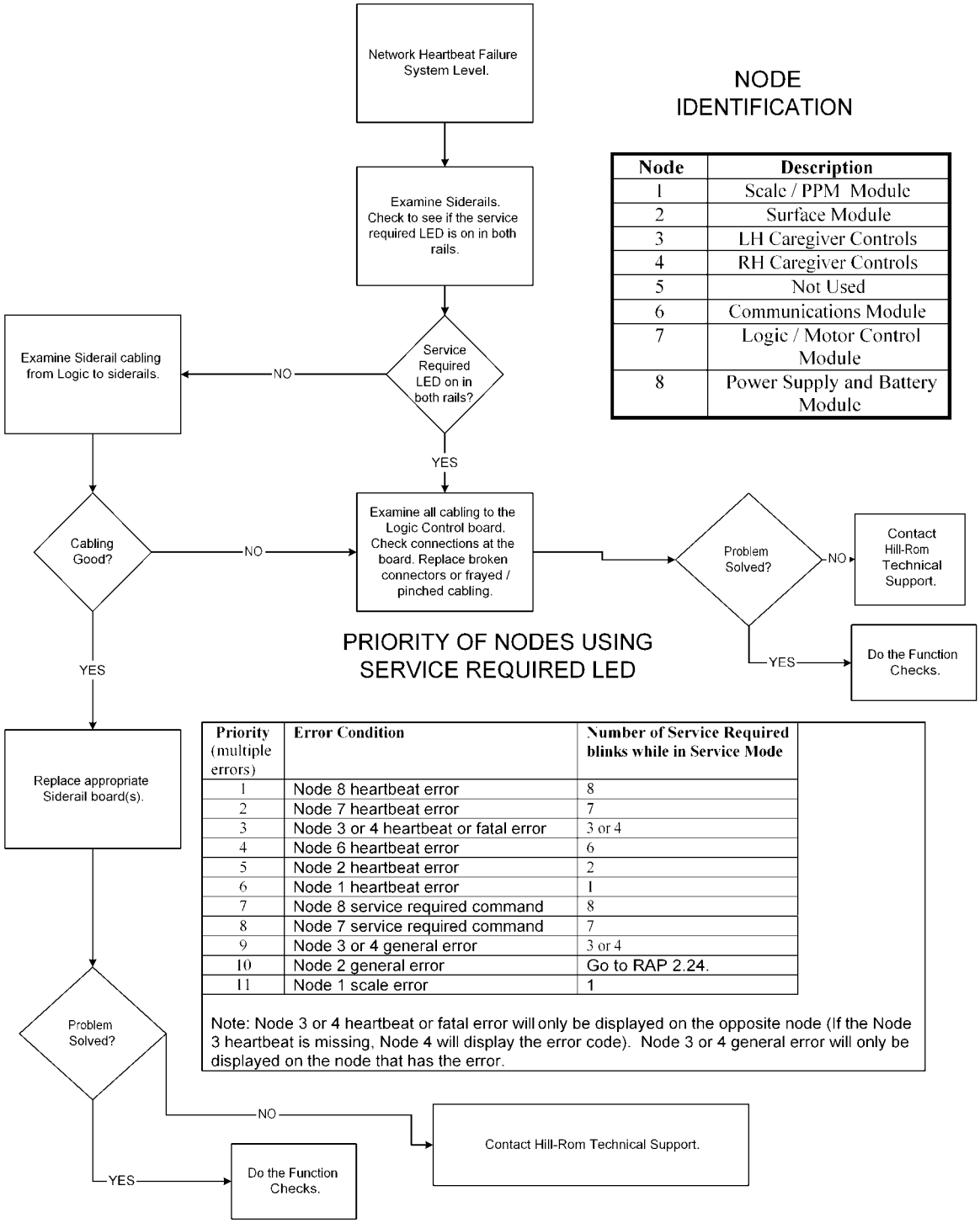
2.10 Hilow Motor Position Rate Low


HILOW drives Position Rate LOW.
Inspect drives, cabling, and possible interference between mechanical interface to the DC drives. Make sure integrity of motor mounting brackets and the DC drive itself. Inspect fully retracted and extended positions of the drives to insure that there is no interference or other issue with mounting. Look for binding and mechanical issues with frames and bed lift arm assemblies.
Issue with cabling, lift arms, drives or mounting systems?
YES
Repair or replace fault cable, drive, or mechanical system.
NO
Reset Power and operate the HILO drives with the HILO controls.
Problem solved?
YES
Do the Function Checks.
NO
Diagnostic LED's in Normal Condition ?
YES
Go to RAP 2.15 on page 2-27.
NO
Identify the diagnostic with the particular drive.
NO
Replace identified drive.
Diagnostic LED's in Normal Condition ?
YES
Contact Hill-Rom Technical Support.

2.11 Absolute Minimum Drive Current Failure


Absolute Minimum Drive Current Failure.
Inspect drives, cabling, and possible interference between mechanical interface to the DC drives. Make sure integrity of motor mounting brackets and the DC drive itself. Inspect fully retracted and extended positions of the drives to insure that there is no interference or other issue with mounting.
Issue with cabling, drives or mounting?
YES
Repair or replace fault cable, drive, or mechanical system.
NO
Reset Power and operate the HILO drives with the HILO controls.
Problem Solved?
YES
Do the Function Checks.
Diagnostic LED's in Normal Condition ?
YES
Go to RAP 2.15 on page 2-27.
NO
Replace Logic Control Board and /or Motor Control Board.
NO
Contact Hill-Rom Technical Support.

2.12 Network Heartbeat Failure System Level


Network Heartbeat Failure System Level.
Examine Siderails. Check to see if the service required LED is on in both rails.
Service Required LED on in both rails?
NO
Examine Siderail cabling from Logic to siderails.
YES
Cabling Good?
NO
Examine all cabling to the Logic Control board. Check connections at the board. Replace broken connectors or frayed / pinched cabling.
Problem Solved?
NO
Contact Hill-Rom Technical Support.
YES
Do the Function Checks.
YES
Replace appropriate Siderail board(s).
Problem Solved?
NO
Contact Hill-Rom Technical Support.
YES
Do the Function Checks.

NODE IDENTIFICATION

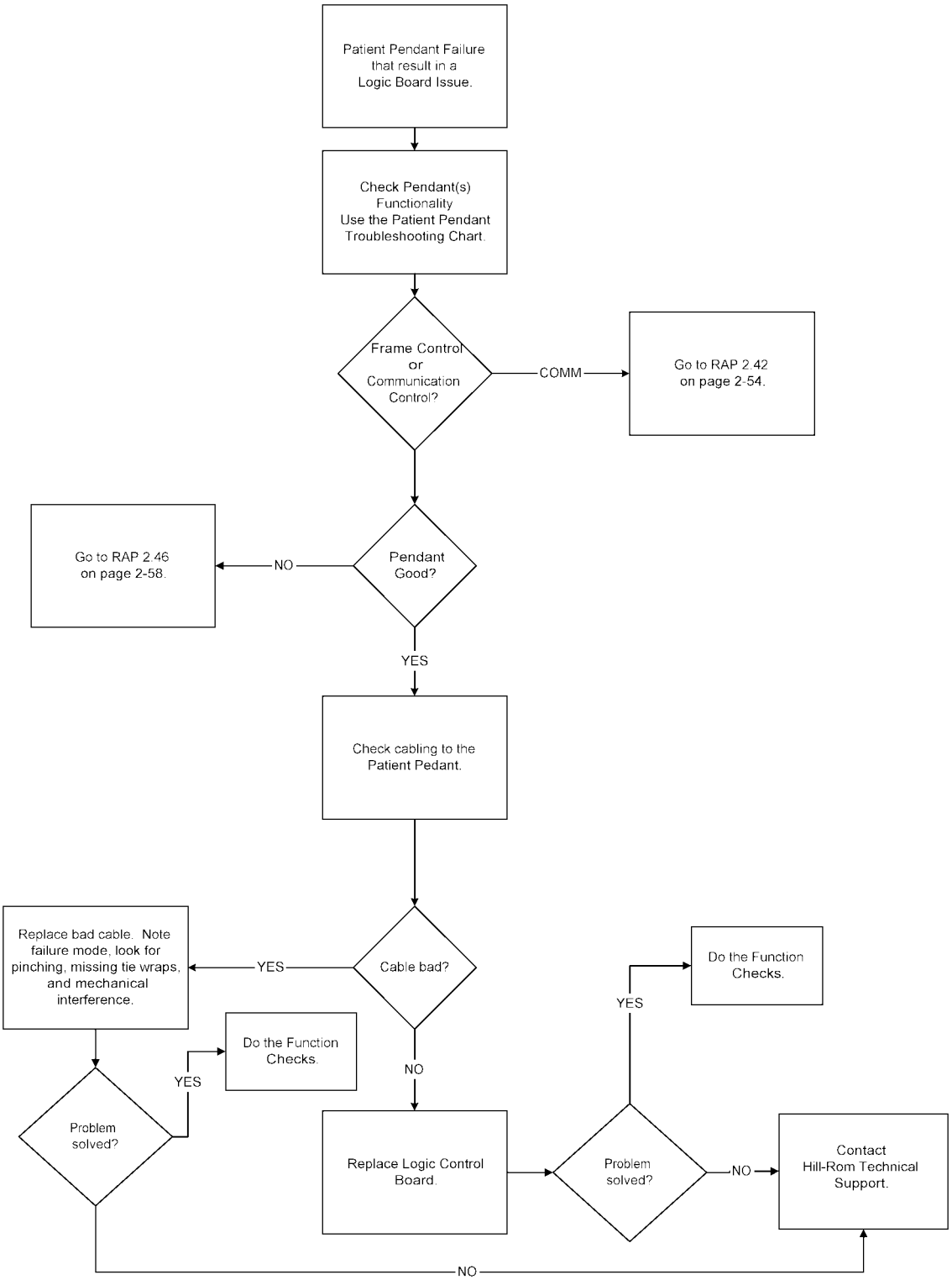
Node	Description
1	Scale / PPM Module
2	Surface Module
3	LH Caregiver Controls
4	RH Caregiver Controls
5	Not Used
6	Communications Module
7	Logic / Motor Control Module
8	Power Supply and Battery Module

PRIORITY OF NODES USING SERVICE REQUIRED LED

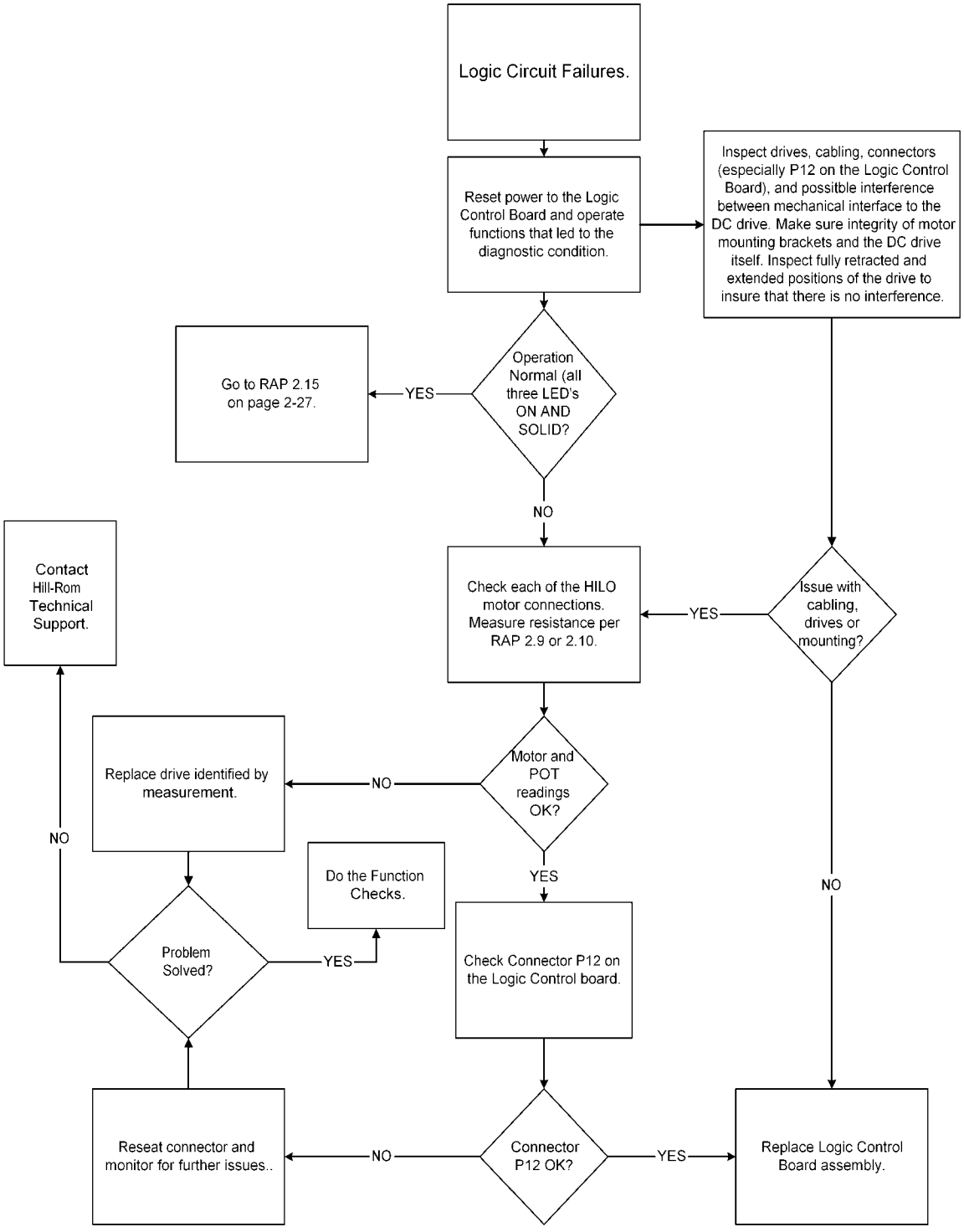
Priority (multiple errors)	Error Condition	Number of Service Required blinks while in Service Mode
1	Node 8 heartbeat error	8
2	Node 7 heartbeat error	7
3	Node 3 or 4 heartbeat or fatal error	3 or 4
4	Node 6 heartbeat error	6
5	Node 2 heartbeat error	2
6	Node 1 heartbeat error	1
7	Node 8 service required command	8
8	Node 7 service required command	7
9	Node 3 or 4 general error	3 or 4
10	Node 2 general error	Go to RAP 2.24.
11	Node 1 scale error	1

Note: Node 3 or 4 heartbeat or fatal error will only be displayed on the opposite node (If the Node 3 heartbeat is missing, Node 4 will display the error code). Node 3 or 4 general error will only be displayed on the node that has the error.

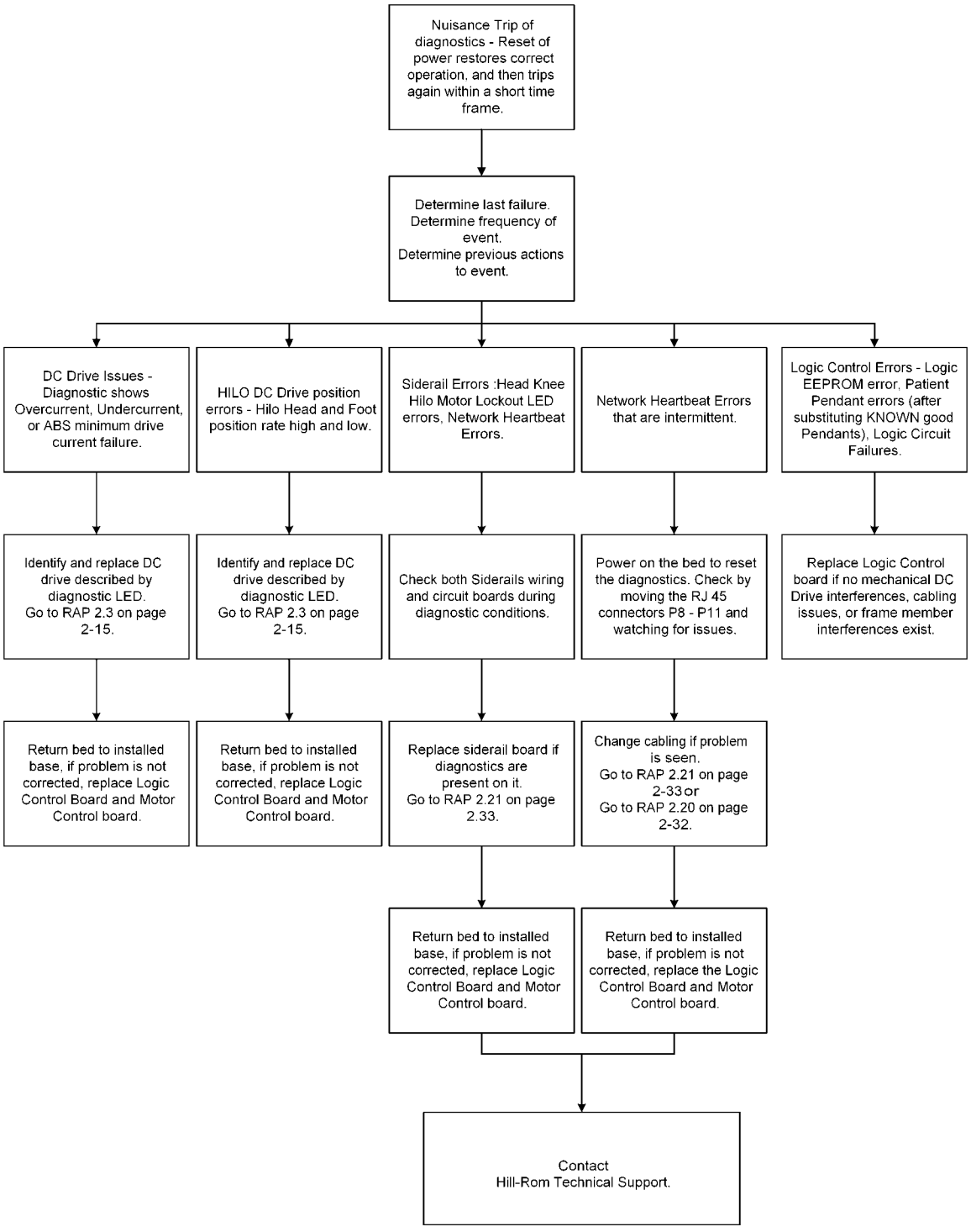
2.13 Patient Pendant Causing Logic P.C. Board Failure



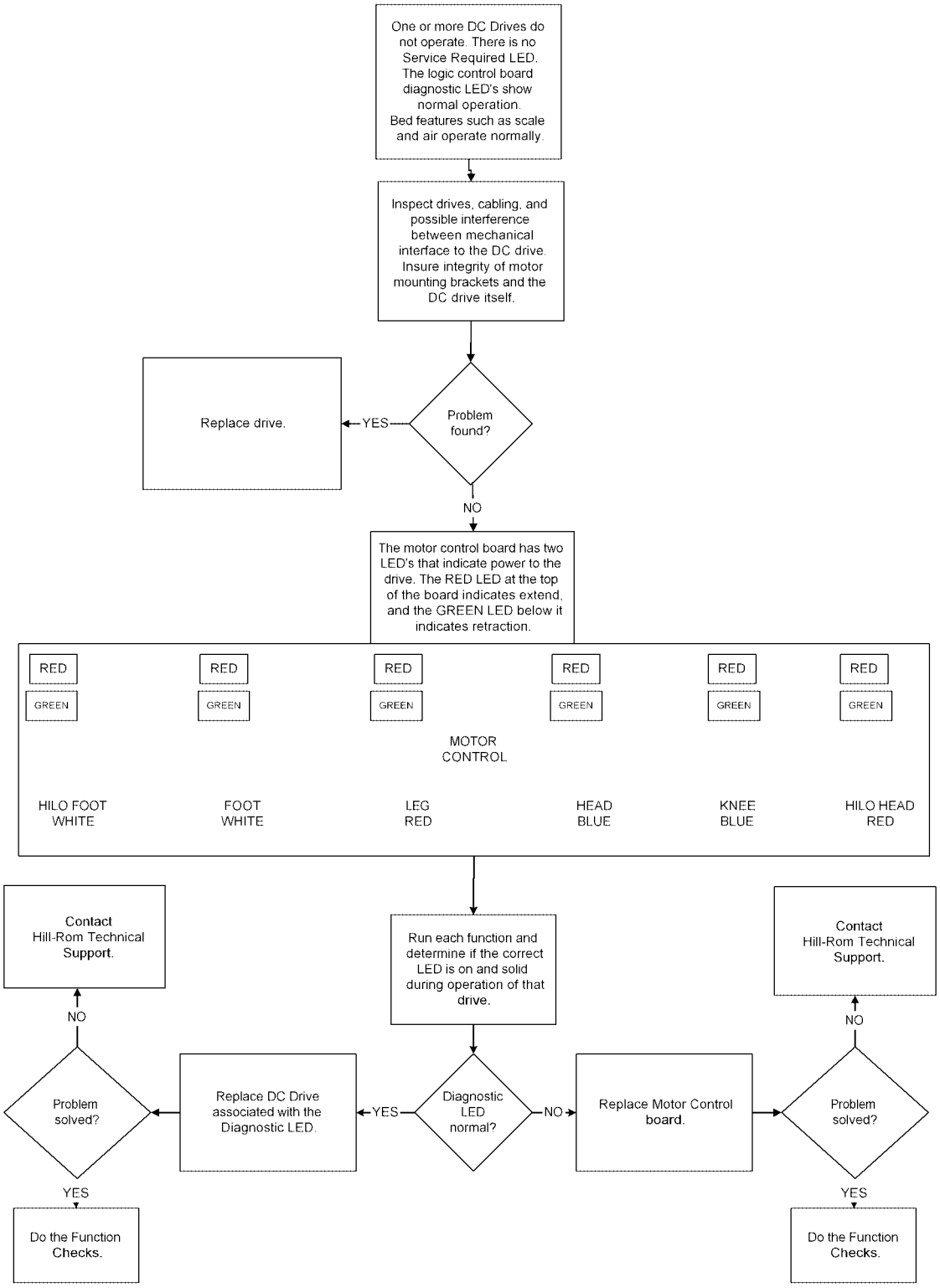
2.14 Logic Circuit Failure


Logic Circuit Failures.
Reset power to the Logic Control Board and operate functions that led to the diagnostic condition.
Inspect drives, cabling, connectors (especially P12 on the Logic Control Board), and possitble interference between mechanical interface to the DC drive. Make sure integrity of motor mounting brackets and the DC drive itself. Inspect fully retracted and extended positions of the drive to insure that there is no interference.
Operation Normal (all three LED's ON AND SOLID?
YES
Go to RAP 2.15 on page 2-27.
NO
Check each of the HILO motor connections. Measure resistance per RAP 2.9 or 2.10.
YES
Issue with cabling, drives or mounting?
Contact Hill-Rom Technical Support.
Motor and POT readings OK?
NO
Replace drive identified by measurement.
NO
YES
Do the Function Checks.
Problem Solved?
YES
NO
Check Connector P12 on the Logic Control board.
Reseat connector and monitor for further issues..
NO
Connector P12 OK?
YES
Replace Logic Control Board assembly.

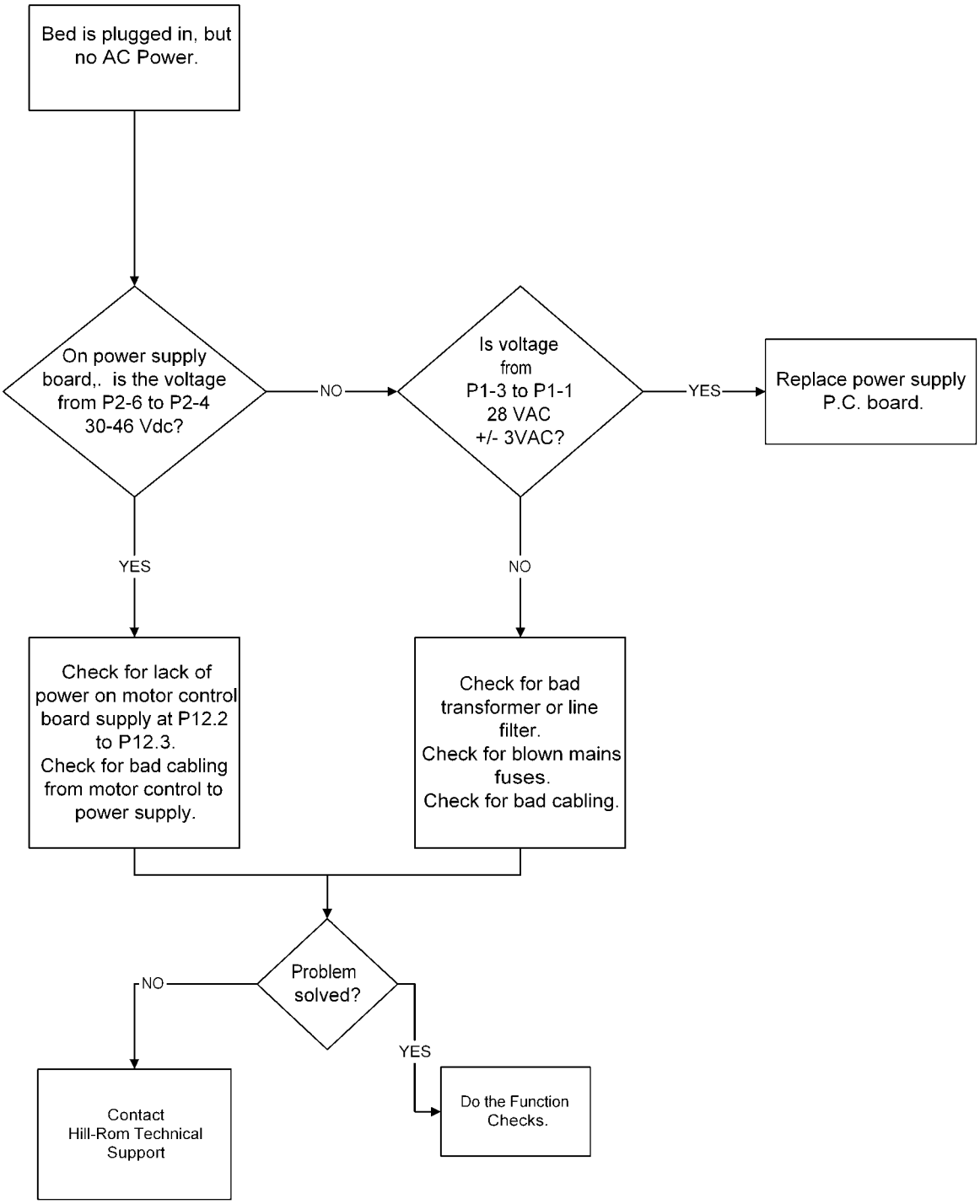
2.15 Nuisance Trip


Nuisance Trip of diagnostics - Reset of power restores correct operation, and then trips again within a short time frame.
Determine last failure.
Determine frequency of event.
Determine previous actions to event.
DC Drive Issues - Diagnostic shows Overcurrent, Undercurrent, or ABS minimum drive current failure.
HILO DC Drive position errors - Hilo Head and Foot position rate high and low.
Siderail Errors :Head Knee Hilo Motor Lockout LED errors, Network Heartbeat Errors.
Network Heartbeat Errors that are intermittent.
Logic Control Errors - Logic EEPROM error, Patient Pendant errors (after substituting KNOWN good Pendants), Logic Circuit Failures.
Identify and replace DC drive described by diagnostic LED.
Go to RAP 2.3 on page 2-15.
Identify and replace DC drive described by diagnostic LED.
Go to RAP 2.3 on page 2-15.
Check both Siderails wiring and circuit boards during diagnostic conditions.
Power on the bed to reset the diagnostics. Check by moving the RJ 45 connectors P8 - P11 and watching for issues.
Replace Logic Control board if no mechanical DC Drive interferences, cabling issues, or frame member interferences exist.
Return bed to installed base, if problem is not corrected, replace Logic Control Board and Motor Control board.
Return bed to installed base, if problem is not corrected, replace Logic Control Board and Motor Control board.
Replace siderail board if diagnostics are present on it.
Go to RAP 2.21 on page 2.33.
Change cabling if problem is seen.
Go to RAP 2.21 on page 2-33 or
Go to RAP 2.20 on page 2-32.
Return bed to installed base, if problem is not corrected, replace Logic Control Board and Motor Control board.
Return bed to installed base, if problem is not corrected, replace the Logic Control Board and Motor Control board.
Contact
Hill-Rom Technical Support.

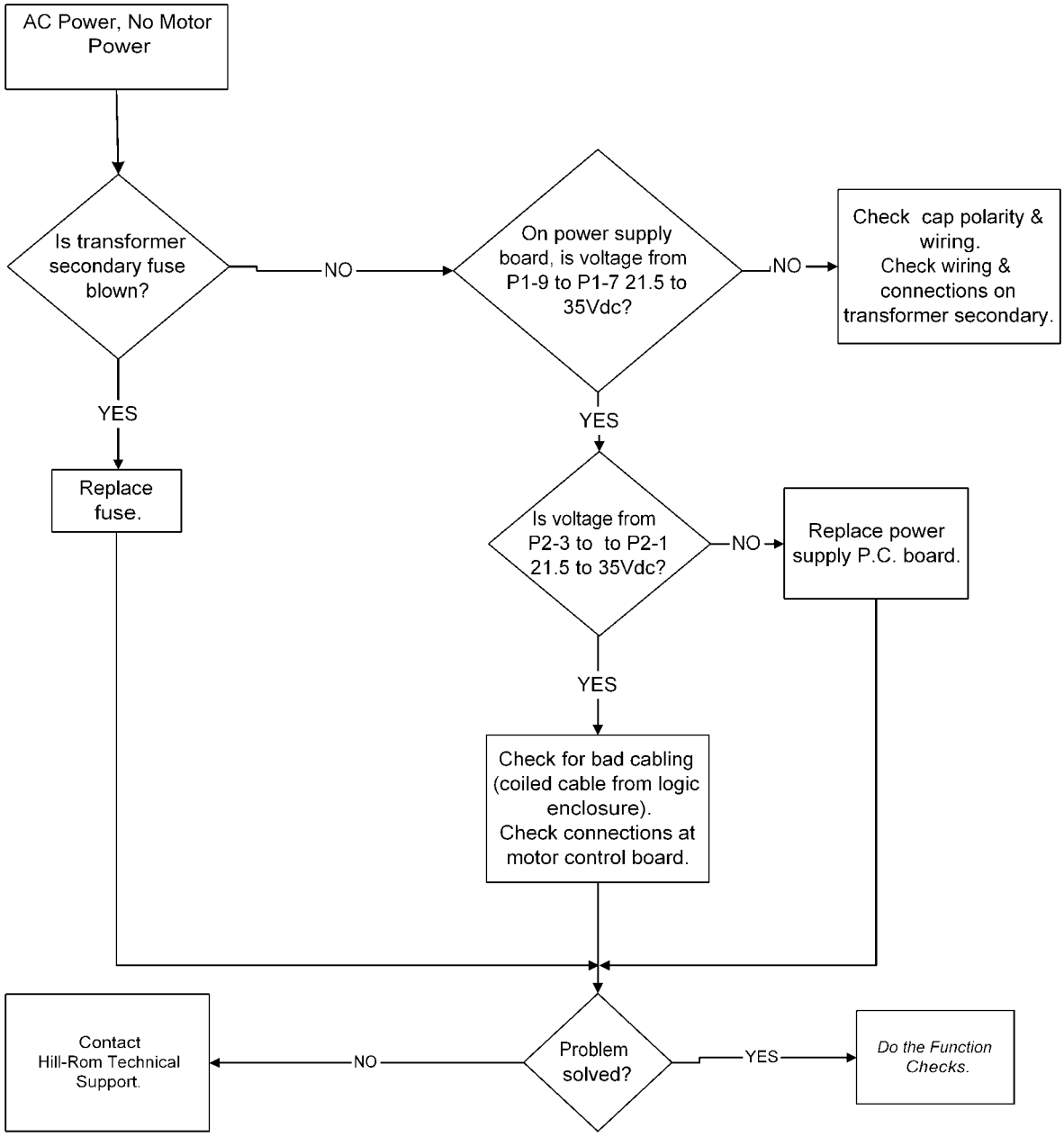
2.16 Motors Do Not Operate


One or more DC Drives do not operate. There is no Service Required LED. The logic control board diagnostic LED's show normal operation. Bed features such as scale and air operate normally.
Inspect drives, cabling, and possible interference between mechanical interface to the DC drive. Insure integrity of motor mounting brackets and the DC drive itself.
Problem found?
YES
Replace drive.
NO
The motor control board has two LED's that indicate power to the drive. The RED LED at the top of the board indicates extend, and the GREEN LED below it indicates retraction.
RED
GREEN
MOTOR CONTROL
HILO FOOT WHITE
FOOT WHITE
LEG RED
HEAD BLUE
KNEE BLUE
HILO HEAD RED
Run each function and determine if the correct LED is on and solid during operation of that drive.
Diagnostic LED normal?
YES
Replace DC Drive associated with the Diagnostic LED.
NO
Replace Motor Control board.
Problem solved?
NO
Contact Hill-Rom Technical Support.
YES
Do the Function Checks.
Problem solved?
NO
Contact Hill-Rom Technical Support.
YES
Do the Function Checks.

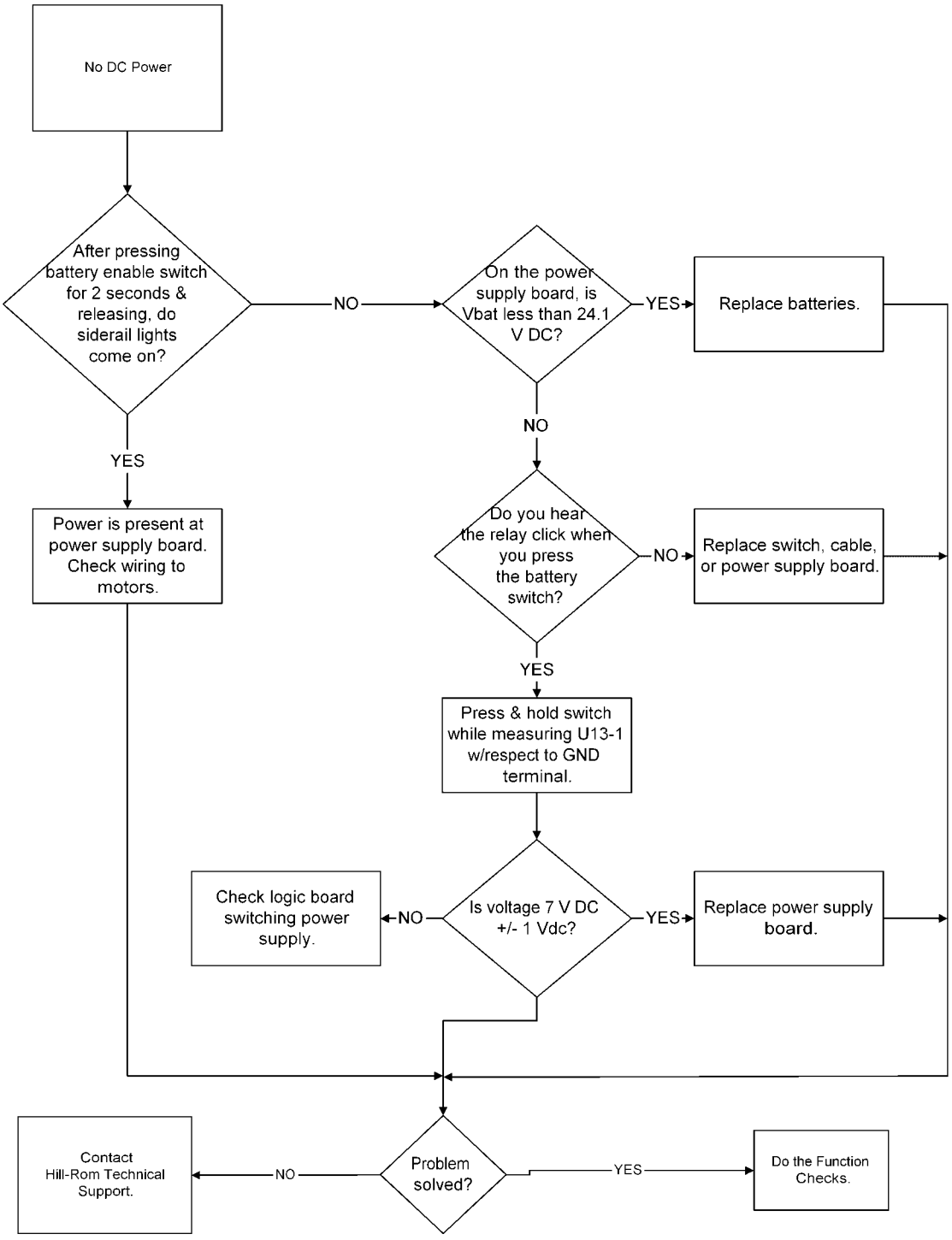
2.17 No AC Power


Bed is plugged in, but no AC Power.
On power supply board,. is the voltage from P2-6 to P2-4 30-46 Vdc?
NO
Is voltage from P1-3 to P1-1 28 VAC +/- 3VAC?
YES
Replace power supply P.C. board.
YES
NO
Check for lack of power on motor control board supply at P12.2 to P12.3. Check for bad cabling from motor control to power supply.
Check for bad transformer or line filter. Check for blown mains fuses. Check for bad cabling.
Problem solved?
NO
YES
Contact Hill-Rom Technical Support
Do the Function Checks.

2.18 AC Power, No Motor Power


AC Power, No Motor Power
Is transformer secondary fuse blown?
NO
On power supply board, is voltage from P1-9 to P1-7 21.5 to 35Vdc?
NO
Check cap polarity & wiring.
Check wiring & connections on transformer secondary.
YES
Replace fuse.
YES
Is voltage from P2-3 to P2-1 21.5 to 35Vdc?
NO
Replace power supply P.C. board.
YES
Check for bad cabling (coiled cable from logic enclosure).
Check connections at motor control board.
Problem solved?
NO
Contact Hill-Rom Technical Support.
YES
Do the Function Checks.

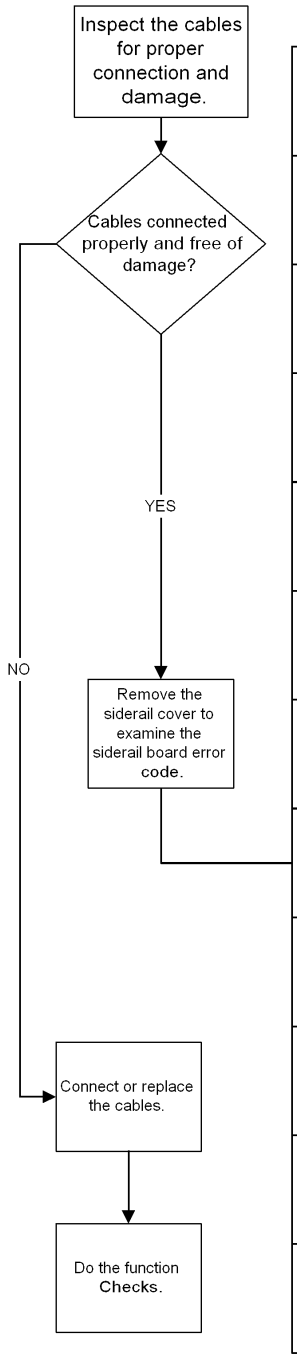
2.19 No DC Power


No DC Power
After pressing battery enable switch for 2 seconds & releasing, do siderail lights come on?
NO
On the power supply board, is Vbat less than 24.1 V DC?
YES
Replace batteries.
YES
NO
Power is present at power supply board. Check wiring to motors.
Do you hear the relay click when you press the battery switch?
NO
Replace switch, cable, or power supply board.
YES
Press & hold switch while measuring U13-1 w/respect to GND terminal.
Check logic board switching power supply.
NO
Is voltage 7 V DC +/- 1 Vdc?
YES
Replace power supply board.
Contact Hill-Rom Technical Support.
NO
Problem solved?
YES
Do the Function Checks.

2.20 Power Supply Error Codes

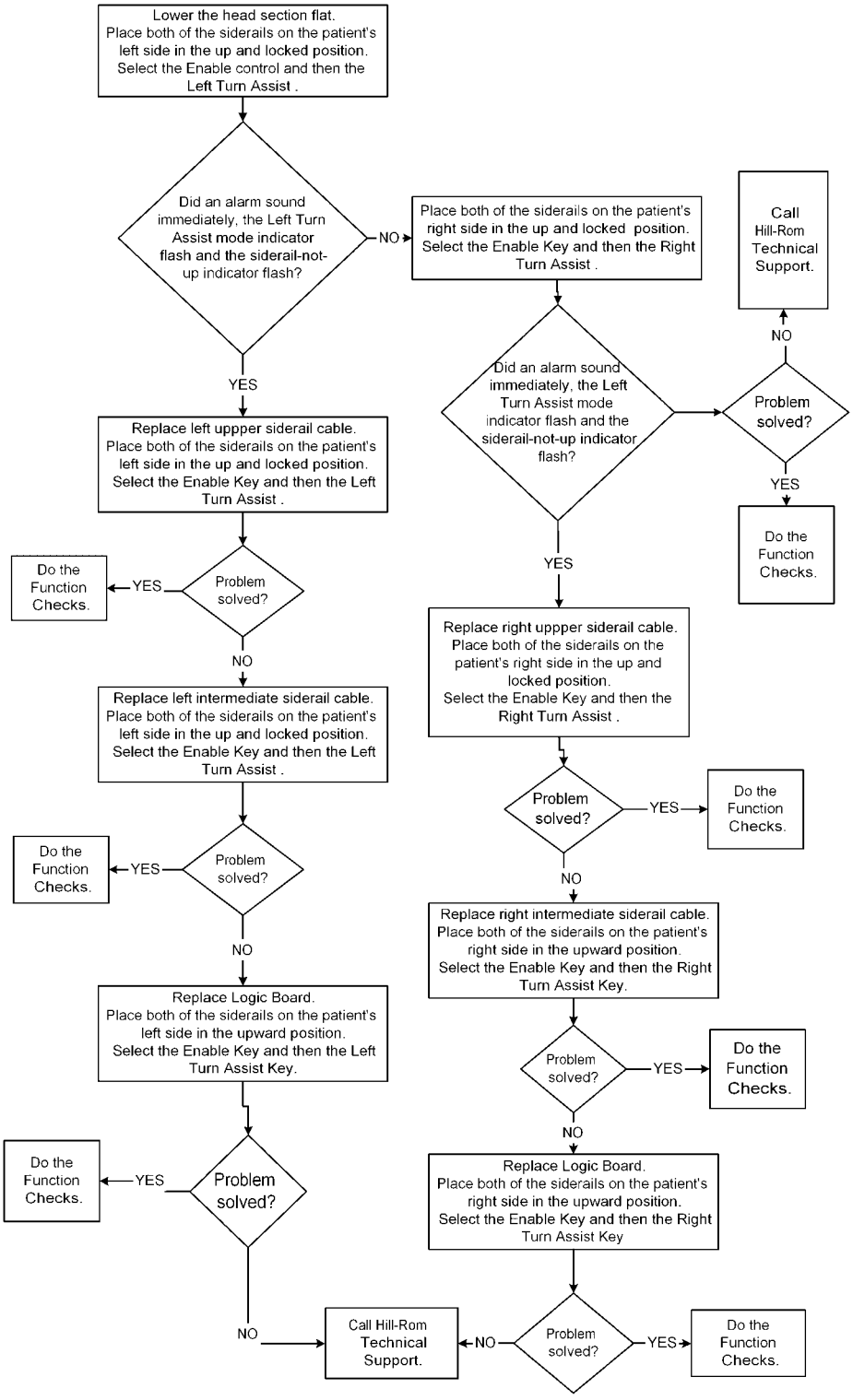
Error #	Led Color	Led DS6	Led DS1	Led DS2	Led DS3	Led DS4	Error	Troubleshooting
0	Red	OFF	OFF	OFF	OFF	OFF	NO ERRORS	Replace board.
1	Red	OFF	OFF	OFF	OFF	ON	STUCK SWITCH	Replace board or faulty caregiver pedal.
10	Red	OFF	ON	OFF	ON	OFF	ENCLOSURE TEMPERATURE	Replace board.
11	Red	OFF	ON	OFF	ON	ON	SMBUS	Replace board.
12	Red	OFF	ON	ON	OFF	OFF	LOW VCC	Replace board.
13	Red	OFF	ON	ON	OFF	ON	LOW BATTERY VOLTAGE	Check battery voltage, battery fuse and replace battery or board.
14	Red	OFF	ON	ON	ON	OFF	CHARGE TIME	Replace battery or board.
15	Red	OFF	ON	ON	ON	ON	D TO A COUNT LIMIT	Replace board.
16	Red	ON	OFF	OFF	OFF	OFF	CHARGE CURRENT	Replace board.
18	Red	ON	OFF	OFF	ON	OFF	VOLT / TIME SLOPE	Replace board.
19	Red	ON	OFF	OFF	ON	ON	CURRENT / TIME SLOPE	Replace board.
20	Red	ON	OFF	ON	OFF	OFF	HIGH BATTERY VOLTAGE	Replace board.
21	Red	ON	OFF	ON	OFF	ON	D TO A OUTPUT	Replace board.
22	Red	ON	OFF	ON	ON	OFF	CURRENT MEASUREMENT DIFFERENCE	Replace board.
23	Red	ON	OFF	ON	ON	ON	CURRENT CALCULATION	Replace board.
24	Red	ON	ON	OFF	OFF	OFF	EXTERNAL EEPROM BUS	Replace board.
25	Red	ON	ON	OFF	OFF	ON	CHARGE TIME 2	Check & replace battery or board.

2.21 Siderail Controls Not Working

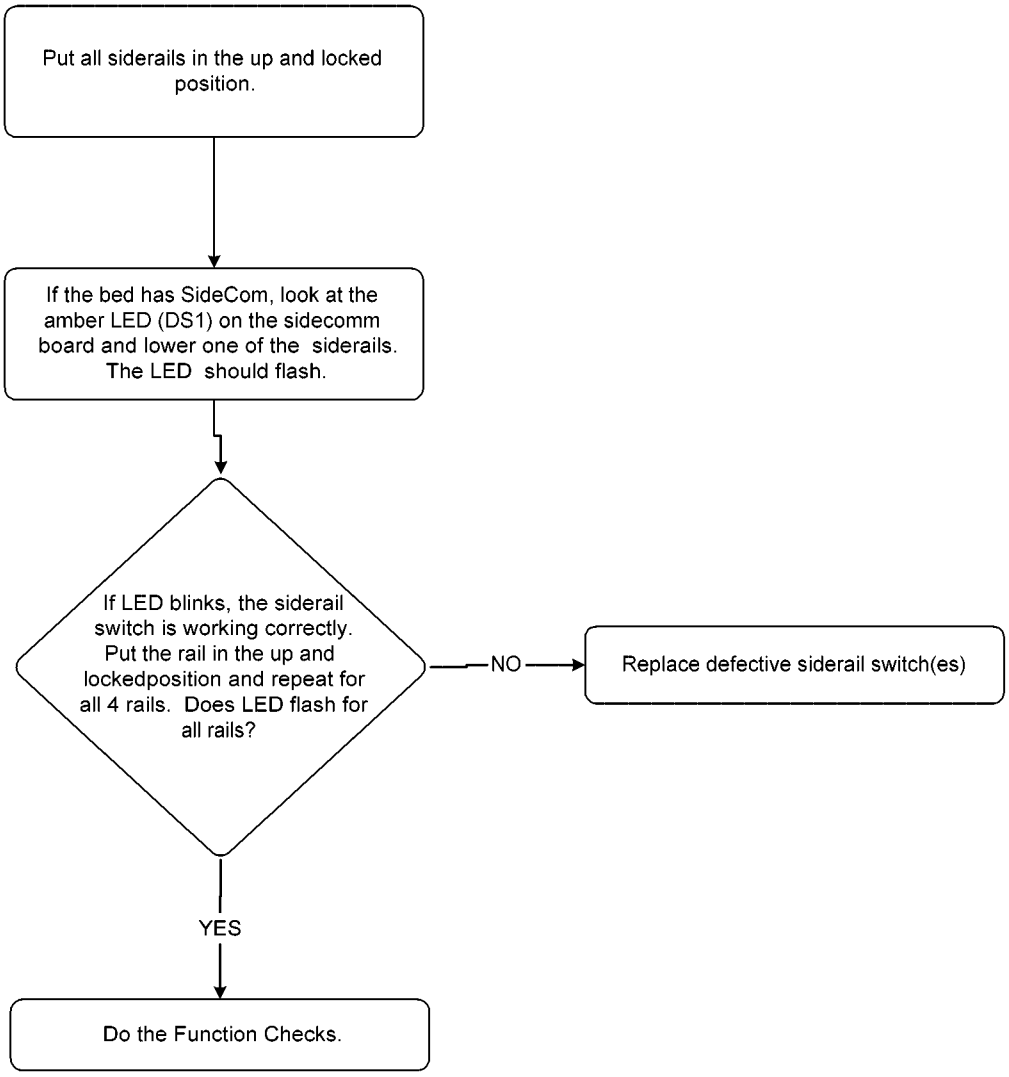

Inspect the cables for proper connection and damage.
Cables connected properly and free of damage?
YES
NO
Remove the siderail cover to examine the siderail board error code.
Connect or replace the cables.
Do the function Checks.

	DS 11	DS 12	DS 13	
SYSTEM_LOCKOUT_LED_ERROR	Off	Blink	Off	Indicates conflict between logic lockout status and caregiver lockout led status. Replace the standard caregiver control board.
SYSTEM_BOARD_ID_ERROR	Off	Blink	Blink	Indicates improper cable connection, bad cable, or bad standard caregiver control board.
SYSTEM_EEPROM_ERROR	Blink	Off	Off	Indicates an unsuccessfull eeprom access. Replace the caregiver control board.
SYSTEM_ADC_TIMEOUT_ERROR	Blink	Off	Blink	Indicates an unsuccessfull adc access. Replace the caregiver control board.
SYSTEM_STANDARD_SHIFT_REGISTER_ERROR	Blink	Blink	Off	Indicates a communications error on the standard caregiver control board. Replace the board.
SYSTEM_PATIENT_SHIFT_REGISTER_ERROR	Blink	Blink	Blink	Indicates a communications error between the standard caregiver control board & the patient control board. Check the cable that connects them, and then each board.
SYSTEM_STANDARD_SWITCH_ERROR	On	On	Blink	Indicates an unanticipated switch voltage reading. Replace the standard caregiver control board.
SYSTEM_STANDARD_STUCK_SWITCH_ERROR	On	Blink	On	A switch on the standard caregiver control board is stuck . Check label, cover, and then replace board.
SYSTEM_ENABLE_STUCK_SWITCH_ERROR	On	Blink	Blink	The enable switch on the standard caregiver control board is stuck . Check label, cover, and then replace board.
SYSTEM_PATIENT_STUCK_SWITCH_ERROR	Blink	On	On	A switch on the patient control board is stuck . Check label, cover, and then replace board.
SYSTEM_OPTIONAL_SHIFT_REGISTER_ERROR	Blink	On	Blink	Indicates a communications error between the standard caregiver control board & the optional caregiver control board. Check the cable that connects them then each board.
SYSTEM_OPTIONAL_STUCK_SWITCH_ERROR	Blink	Blink	On	A switch on the optional caregiver control board is stuck . Check label, cover, and then replace board.
SYSTEM_READ3_EEPROM_ERROR	Blink	Blink	Blink	Indicates an unsuccessfull EEPROM access. Replace the caregiver control board.

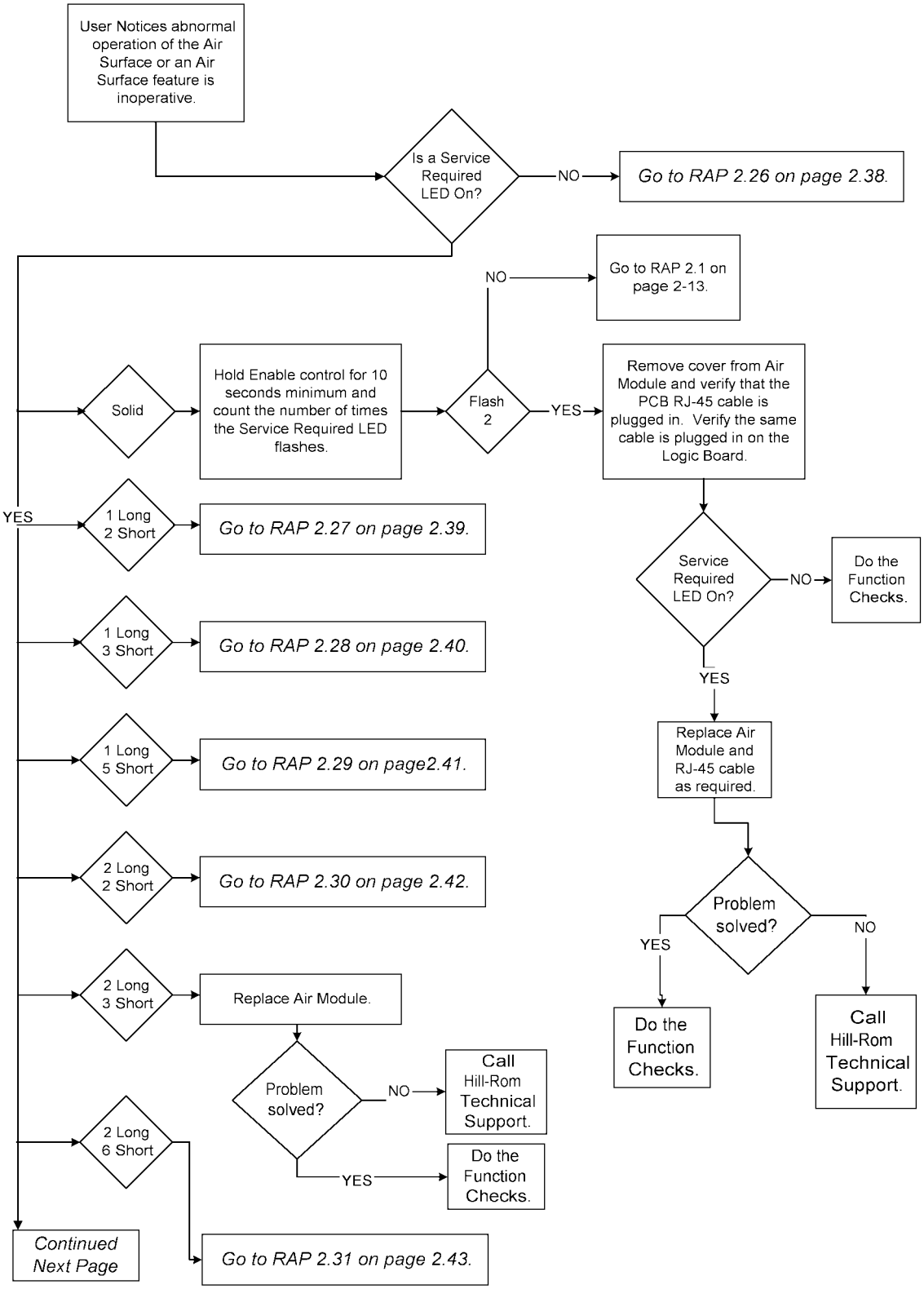
2.22 Siderail Detection Switch Without SideCom® Communication System


Lower the head section flat. Place both of the siderails on the patient's left side in the up and locked position. Select the Enable control and then the Left Turn Assist .
Did an alarm sound immediately, the Left Turn Assist mode indicator flash and the siderail-not-up indicator flash?
NO
YES
Place both of the siderails on the patient's right side in the up and locked position. Select the Enable Key and then the Right Turn Assist .
Call Hill-Rom Technical Support.
Did an alarm sound immediately, the Left Turn Assist mode indicator flash and the siderail-not-up indicator flash?
Problem solved?
NO
YES
Do the Function Checks.
YES
Replace left uppper siderail cable. Place both of the siderails on the patient's left side in the up and locked position. Select the Enable Key and then the Left Turn Assist .
Do the Function Checks.
YES
Problem solved?
NO
Replace right uppper siderail cable. Place both of the siderails on the patient's right side in the up and locked position. Select the Enable Key and then the Right Turn Assist .
Replace left intermediate siderail cable. Place both of the siderails on the patient's left side in the up and locked position. Select the Enable Key and then the Left Turn Assist .
Problem solved?
YES
Do the Function Checks.
NO
Do the Function Checks.
YES
Problem solved?
NO
Replace right intermediate siderail cable. Place both of the siderails on the patient's right side in the upward position. Select the Enable Key and then the Right Turn Assist Key.
Replace Logic Board. Place both of the siderails on the patient's left side in the upward position. Select the Enable Key and then the Left Turn Assist Key.
Problem solved?
YES
Do the Function Checks.
NO
Do the Function Checks.
YES
Problem solved?
Replace Logic Board. Place both of the siderails on the patient's right side in the upward position. Select the Enable Key and then the Right Turn Assist Key
NO
Call Hill-Rom Technical Support.
NO
Problem solved?
YES
Do the Function Checks.

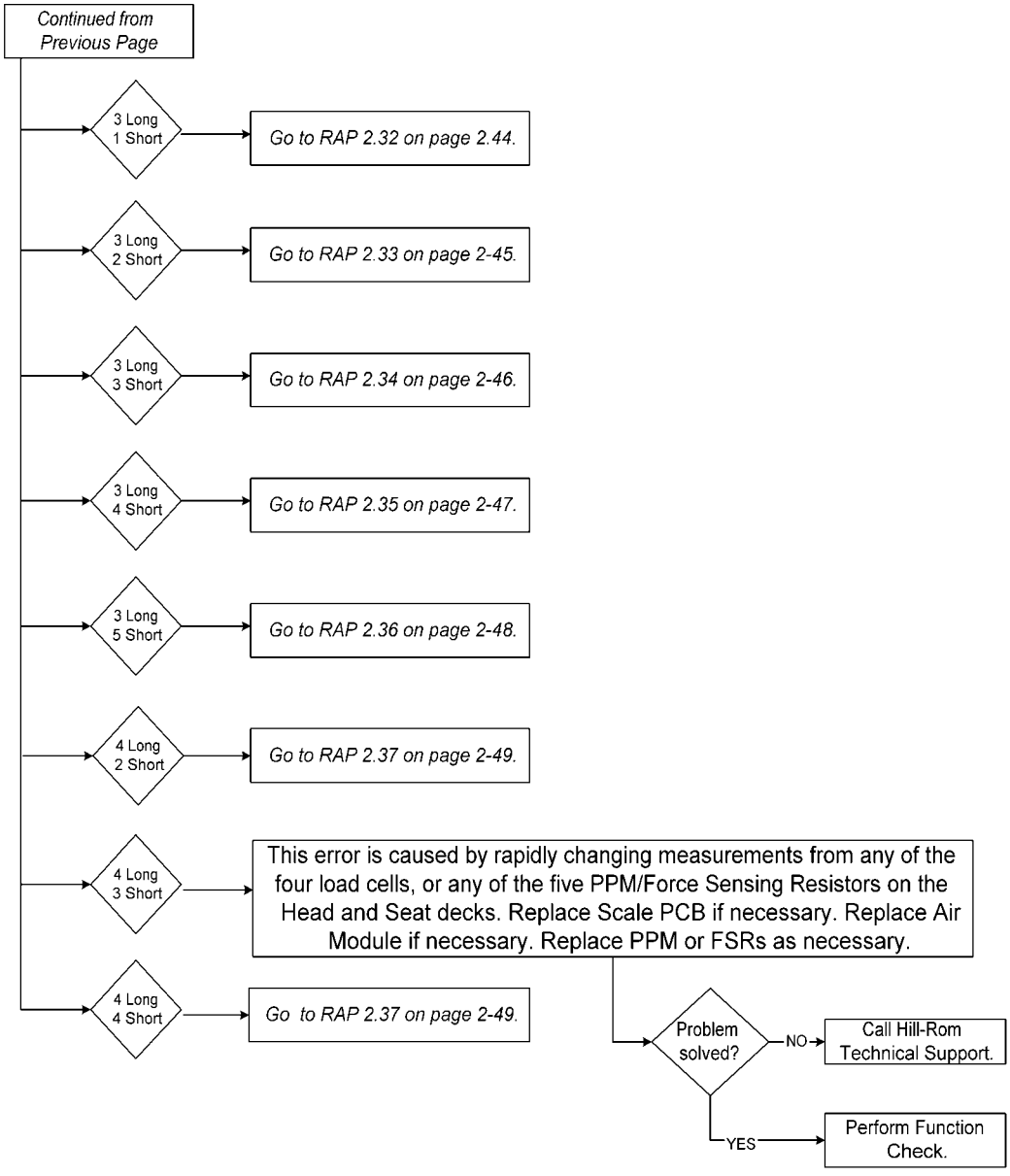
2.23 Siderail Detection Switch With SideCom® Communication System


Put all siderails in the up and locked position.
If the bed has SideCom, look at the amber LED (DS1) on the sidecomm board and lower one of the siderails. The LED should flash.
If LED blinks, the siderail switch is working correctly. Put the rail in the up and lockedposition and repeat for all 4 rails. Does LED flash for all rails?
NO
Replace defective siderail switch(es)
YES
Do the Function Checks.

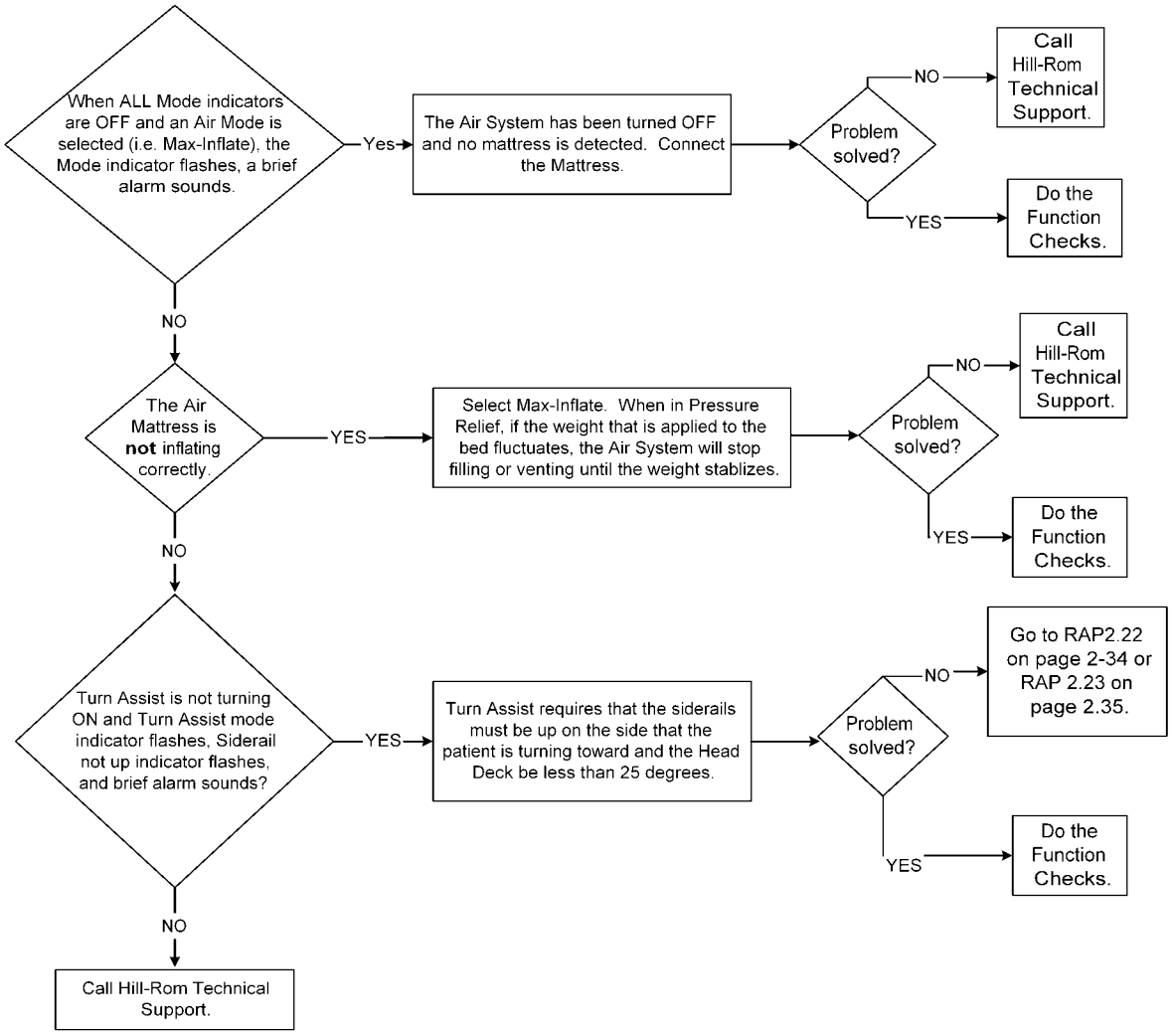
2.24 Air Surface (Sheet 1 of 2)


User Notices abnormal operation of the Air Surface or an Air Surface feature is inoperative.
Is a Service Required LED On?
NO
Go to RAP 2.26 on page 2.38.
NO
Go to RAP 2.1 on page 2-13.
Solid
Hold Enable control for 10 seconds minimum and count the number of times the Service Required LED flashes.
Flash 2
YES
Remove cover from Air Module and verify that the PCB RJ-45 cable is plugged in. Verify the same cable is plugged in on the Logic Board.
YES
1 Long 2 Short
Go to RAP 2.27 on page 2.39.
Service Required LED On?
NO
Do the Function Checks.
YES
1 Long 3 Short
Go to RAP 2.28 on page 2.40.
Replace Air Module and RJ-45 cable as required.
1 Long 5 Short
Go to RAP 2.29 on page2.41.
Problem solved?
YES
NO
2 Long 2 Short
Go to RAP 2.30 on page 2.42.
Do the Function Checks.
Call Hill-Rom Technical Support.
2 Long 3 Short
Replace Air Module.
Problem solved?
NO
Call Hill-Rom Technical Support.
YES
Do the Function Checks.
2 Long 6 Short
Continued Next Page
Go to RAP 2.31 on page 2.43.

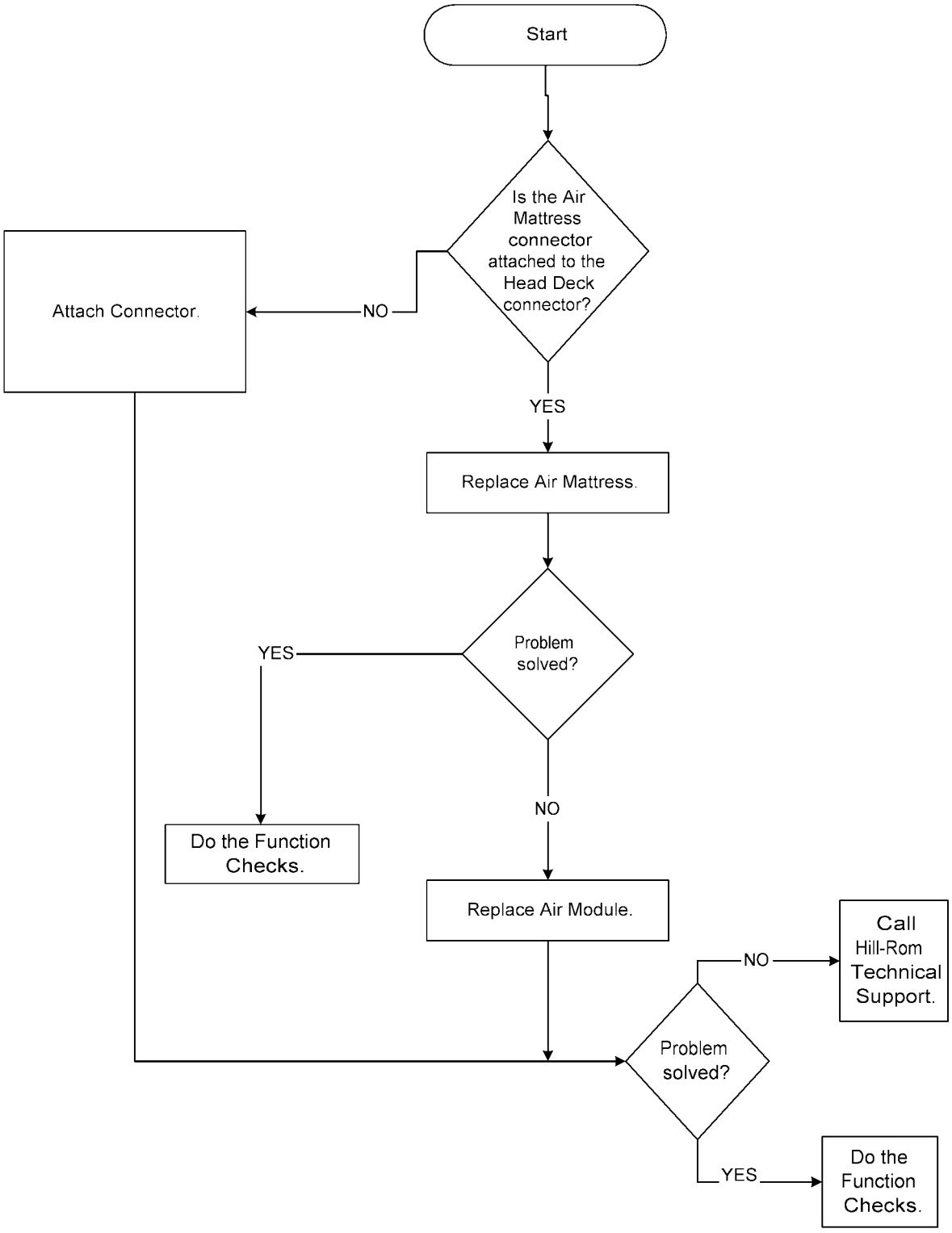
2.25 Air Surface (Sheet 2 of 2)


Continued from Previous Page
3 Long 1 Short
Go to RAP 2.32 on page 2.44.
3 Long 2 Short
Go to RAP 2.33 on page 2-45.
3 Long 3 Short
Go to RAP 2.34 on page 2-46.
3 Long 4 Short
Go to RAP 2.35 on page 2-47.
3 Long 5 Short
Go to RAP 2.36 on page 2-48.
4 Long 2 Short
Go to RAP 2.37 on page 2-49.
4 Long 3 Short
This error is caused by rapidly changing measurements from any of the four load cells, or any of the five PPM/Force Sensing Resistors on the Head and Seat decks. Replace Scale PCB if necessary. Replace Air Module if necessary. Replace PPM or FSRs as necessary.
4 Long 4 Short
Go to RAP 2.37 on page 2-49.
Problem solved?
NO
Call Hill-Rom Technical Support.
YES
Perform Function Check.

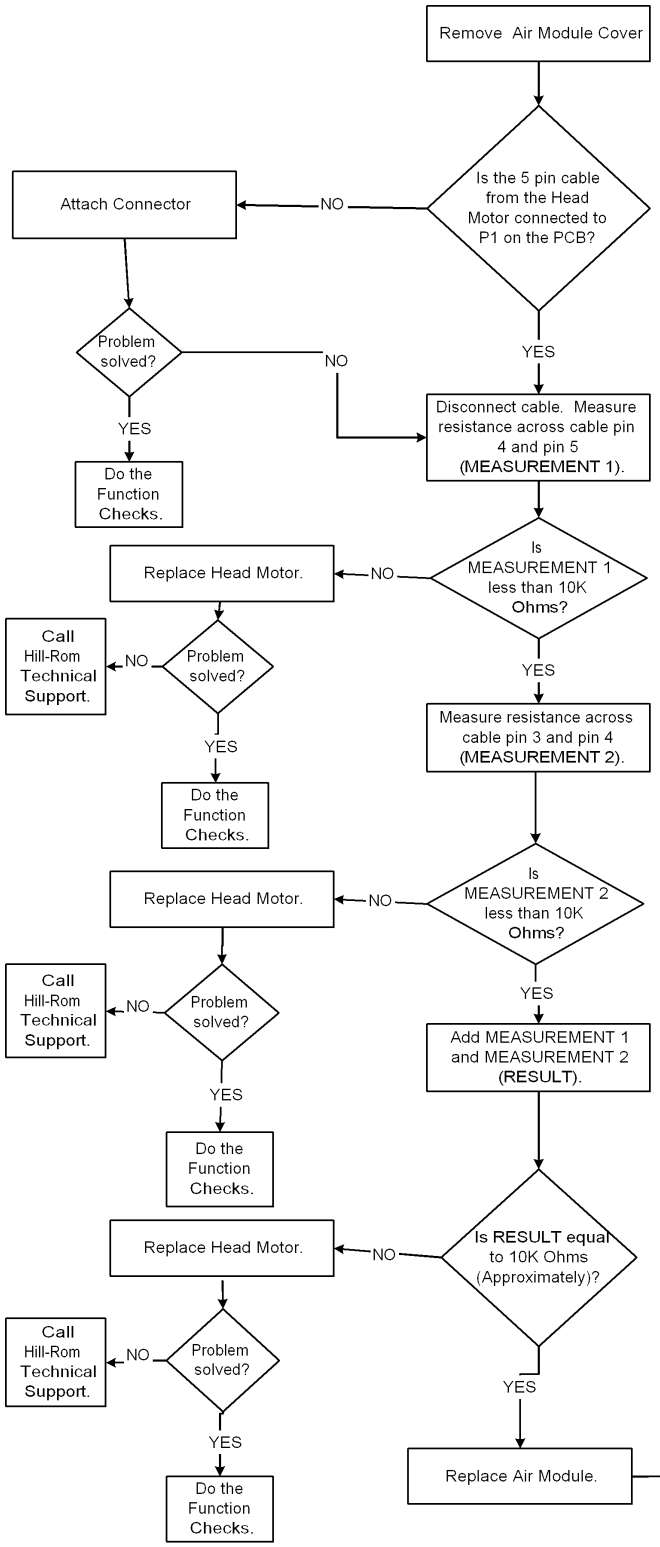
2.26 System Error, No Flash Code


When ALL Mode indicators are OFF and an Air Mode is selected (i.e. Max-Inflate), the Mode indicator flashes, a brief alarm sounds.
Yes
The Air System has been turned OFF and no mattress is detected. Connect the Mattress.
Problem solved?
NO
Call Hill-Rom Technical Support.
YES
Do the Function Checks.
NO
The Air Mattress is **not** inflating correctly.
YES
Select Max-Inflate. When in Pressure Relief, if the weight that is applied to the bed fluctuates, the Air System will stop filling or venting until the weight stablizes.
Problem solved?
NO
Call Hill-Rom Technical Support.
YES
Do the Function Checks.
NO
Turn Assist is not turning ON and Turn Assist mode indicator flashes, Siderail not up indicator flashes, and brief alarm sounds?
YES
Turn Assist requires that the siderails must be up on the side that the patient is turning toward and the Head Deck be less than 25 degrees.
Problem solved?
NO
Go to RAP2.22 on page 2-34 or RAP 2.23 on page 2.35.
YES
Do the Function Checks.
NO
Call Hill-Rom Technical Support.

2.27 Mattress Disconnected



2.28 Head Angle Sensor Error



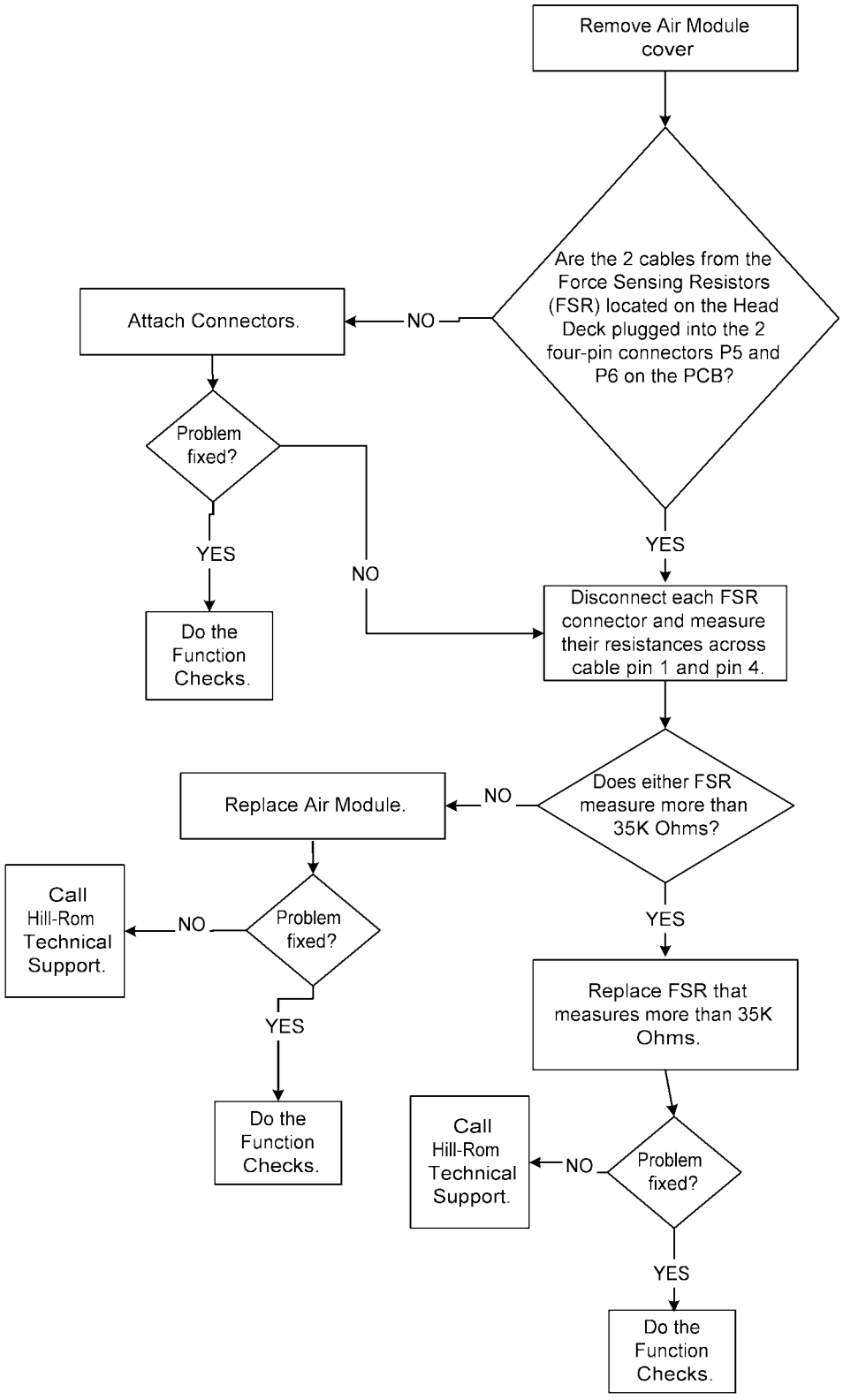
Stroke length of DC Drive
Versus
Resistance of Potentiometer

Stroke Length extended	Rx * see note Drive Extension 28.4 ohms /mm Values Approx
Fully Retracted position	Add to retracted position reading
1 mm	128.4
11 mm	412.5
21 mm	696.6
31 mm	980.7
41 mm	1264.8
51 mm	1548.9
61 mm	1833
71 mm	2117.1
81 mm	2401.2
91 mm	2685.3
101 mm	2969.4
111 mm	3253.5
121 mm	3537.6
131 mm	3821.7
141 mm	4105.8
151 mm	4389.9
161 mm	4674
171 mm	4958.1
181 mm	5242.2

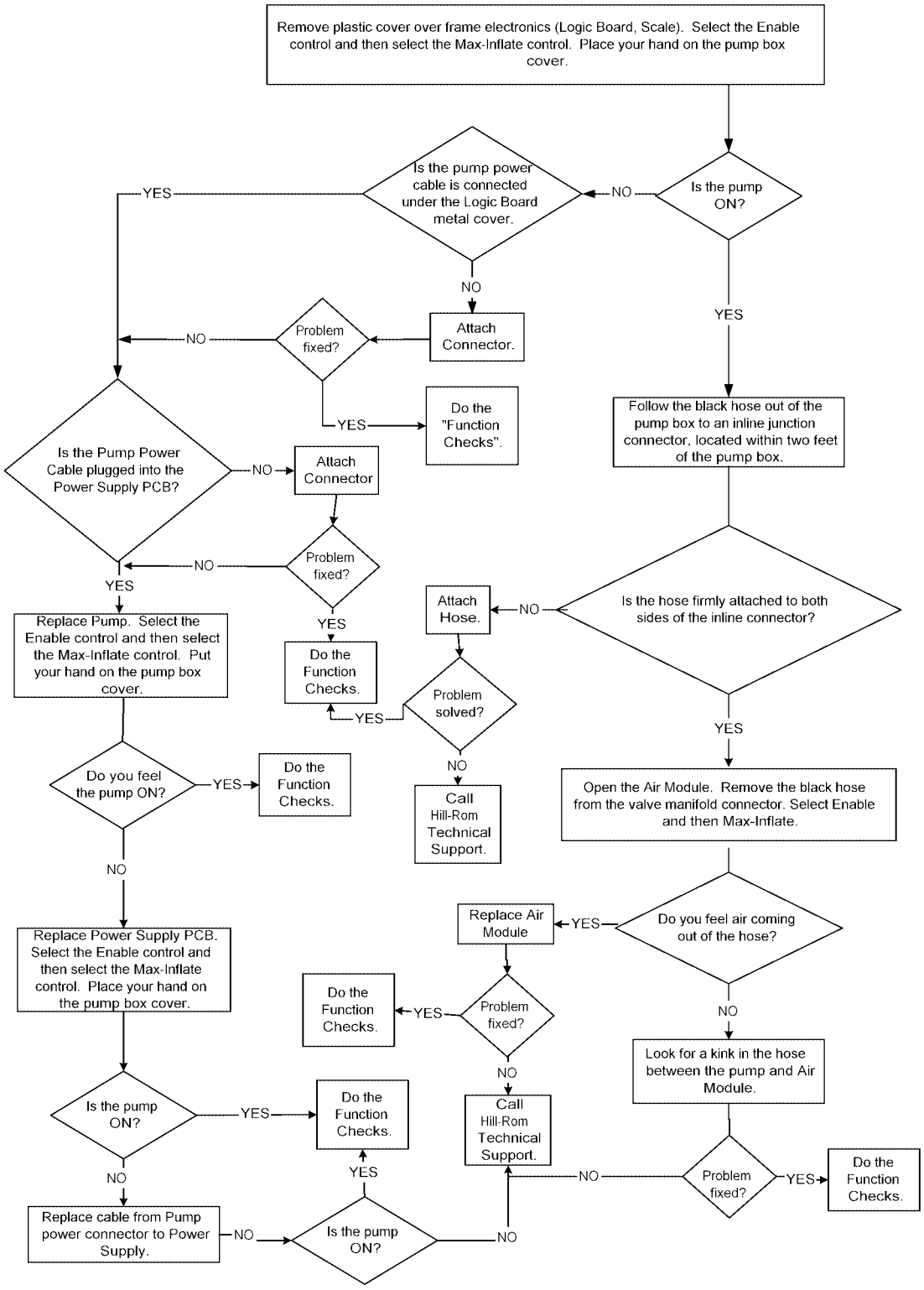
NOTE* : Measured from pin 4 of the motor connector to pin 5. Always check pin 4 to pin 3 for the difference of resistance. This is calculated by Rx = 10K - reading from pin 4 to 3

2

2.29 Head FSR1 and FSR2

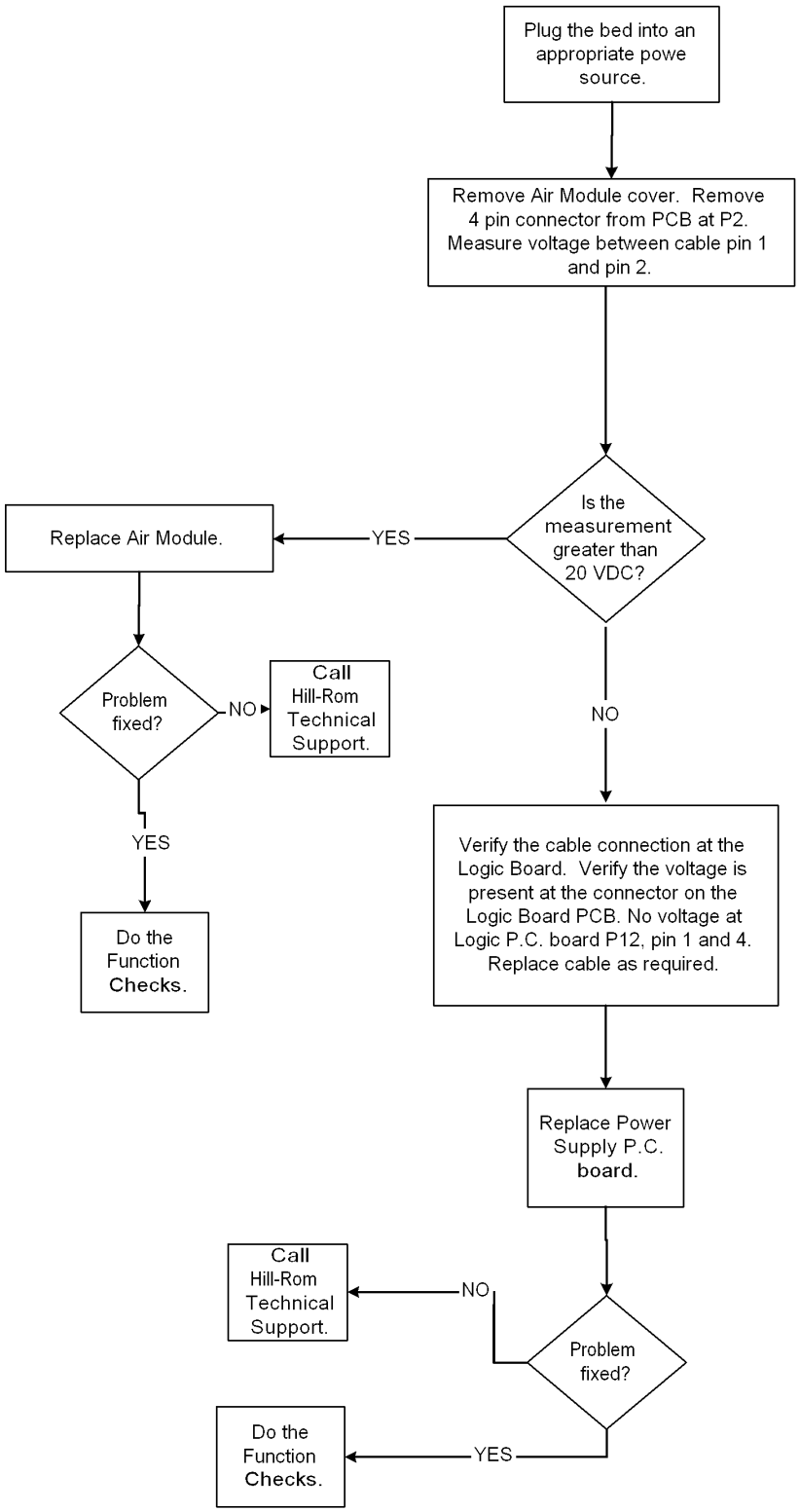

Remove Air Module cover
Are the 2 cables from the Force Sensing Resistors (FSR) located on the Head Deck plugged into the 2 four-pin connectors P5 and P6 on the PCB?
NO
Attach Connectors.
Problem fixed?
YES
Do the Function Checks.
NO
YES
Disconnect each FSR connector and measure their resistances across cable pin 1 and pin 4.
Does either FSR measure more than 35K Ohms?
NO
Replace Air Module.
Problem fixed?
NO
Call Hill-Rom Technical Support.
YES
Do the Function Checks.
YES
Replace FSR that measures more than 35K Ohms.
Problem fixed?
NO
Call Hill-Rom Technical Support.
YES
Do the Function Checks.

2.30 Accumulator Pressure

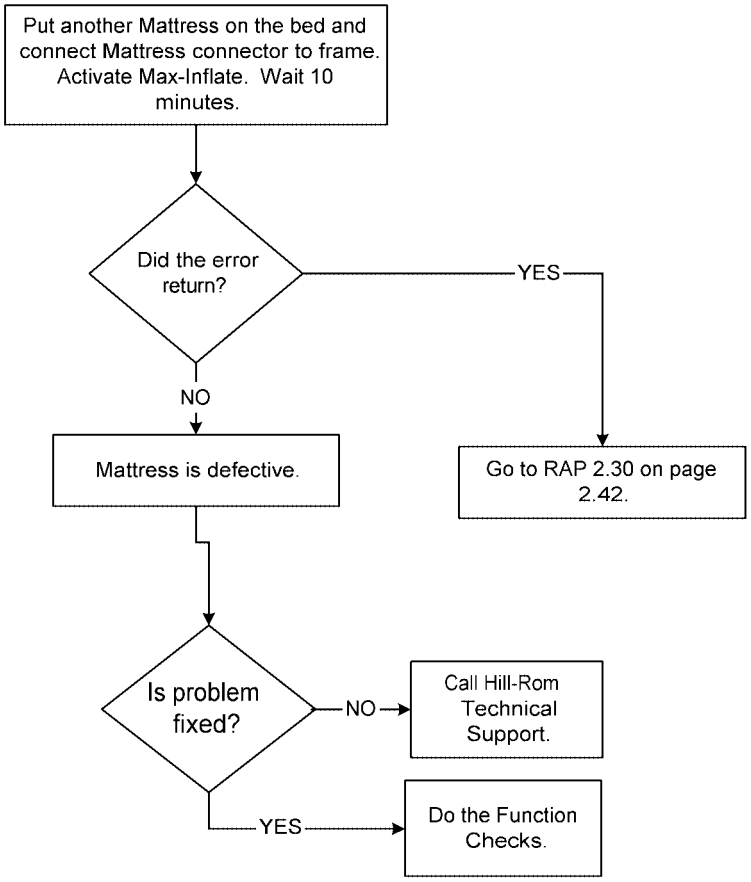

Remove plastic cover over frame electronics (Logic Board, Scale). Select the Enable control and then select the Max-Inflate control. Place your hand on the pump box cover.
Is the pump ON?
NO
Is the pump power cable is connected under the Logic Board metal cover.
YES
NO
Attach Connector.
Problem fixed?
NO
YES
Do the "Function Checks".
YES
Follow the black hose out of the pump box to an inline junction connector, located within two feet of the pump box.
Is the Pump Power Cable plugged into the Power Supply PCB?
NO
Attach Connector
Problem fixed?
NO
YES
YES
Is the hose firmly attached to both sides of the inline connector?
NO
Attach Hose.
Problem solved?
YES
NO
Call Hill-Rom Technical Support.
YES
Do the Function Checks.
Replace Pump. Select the Enable control and then select the Max-Inflate control. Put your hand on the pump box cover.
Do you feel the pump ON?
YES
Do the Function Checks.
NO
Open the Air Module. Remove the black hose from the valve manifold connector. Select Enable and then Max-Inflate.
Do you feel air coming out of the hose?
YES
Replace Air Module
Problem fixed?
YES
Do the Function Checks.
NO
Call Hill-Rom Technical Support.
NO
Look for a kink in the hose between the pump and Air Module.
Problem fixed?
NO
YES
Do the Function Checks.
Replace Power Supply PCB. Select the Enable control and then select the Max-Inflate control. Place your hand on the pump box cover.
Is the pump ON?
YES
Do the Function Checks.
NO
YES
Replace cable from Pump power connector to Power Supply.
NO
Is the pump ON?
NO

2

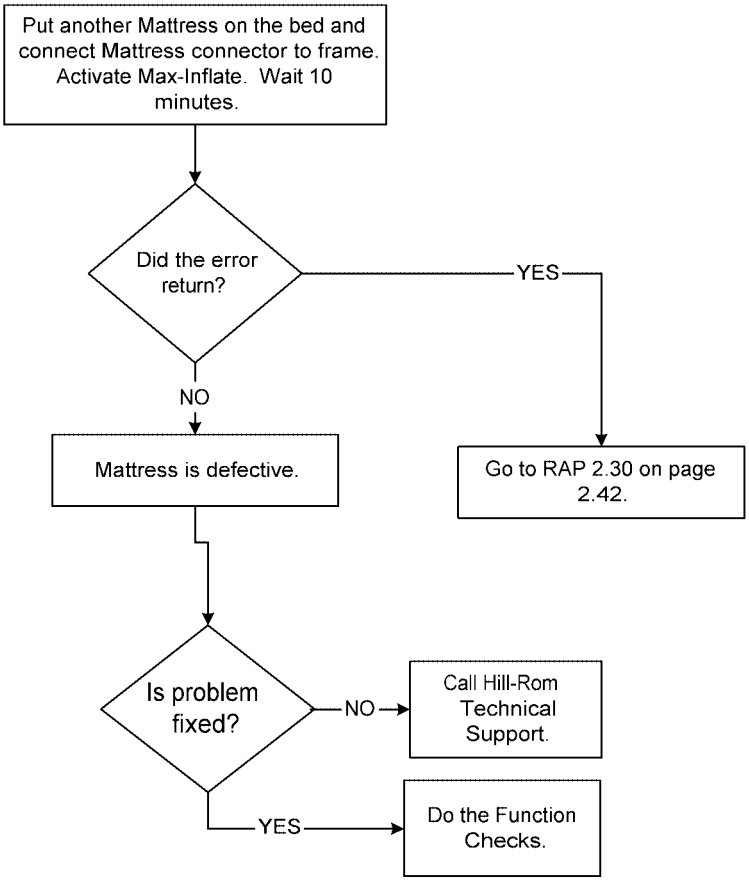
2.31 Missing 24 V DC Input


Plug the bed into an appropriate powe source.
Remove Air Module cover. Remove 4 pin connector from PCB at P2. Measure voltage between cable pin 1 and pin 2.
Is the measurement greater than 20 VDC?
YES
Replace Air Module.
Problem fixed?
NO
Call Hill-Rom Technical Support.
YES
Do the Function Checks.
NO
Verify the cable connection at the Logic Board. Verify the voltage is present at the connector on the Logic Board PCB. No voltage at Logic P.C. board P12, pin 1 and 4. Replace cable as required.
Replace Power Supply P.C. board.
Problem fixed?
NO
Call Hill-Rom Technical Support.
YES
Do the Function Checks.

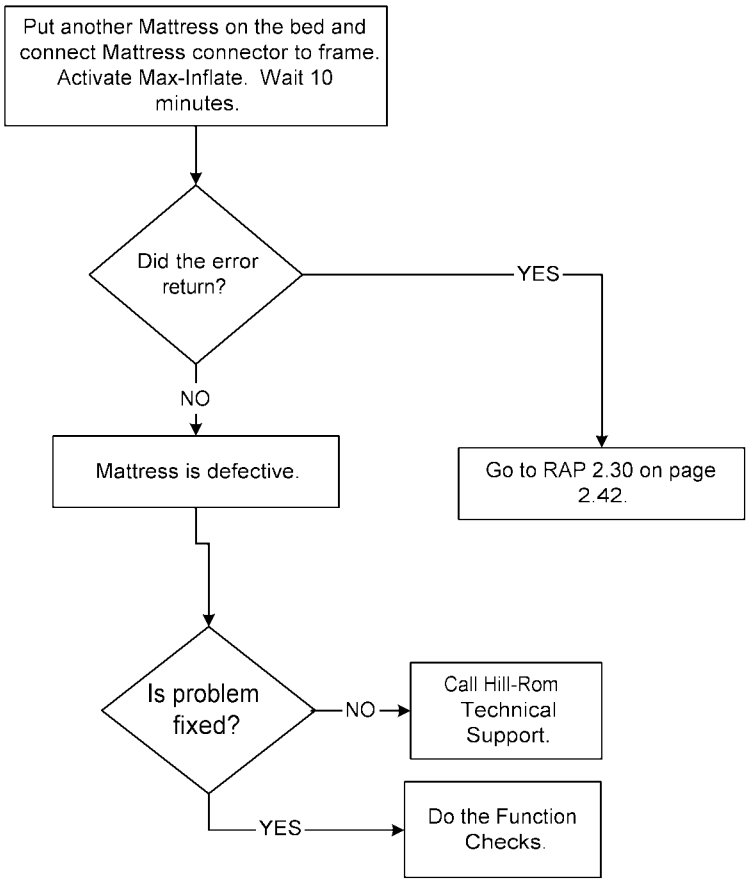
2.32 Not Reaching Head Zone Pressure


Put another Mattress on the bed and connect Mattress connector to frame. Activate Max-Inflate. Wait 10 minutes.
Did the error return?
YES
NO
Mattress is defective.
Go to RAP 2.30 on page 2.42.
Is problem fixed?
NO
Call Hill-Rom Technical Support.
YES
Do the Function Checks.

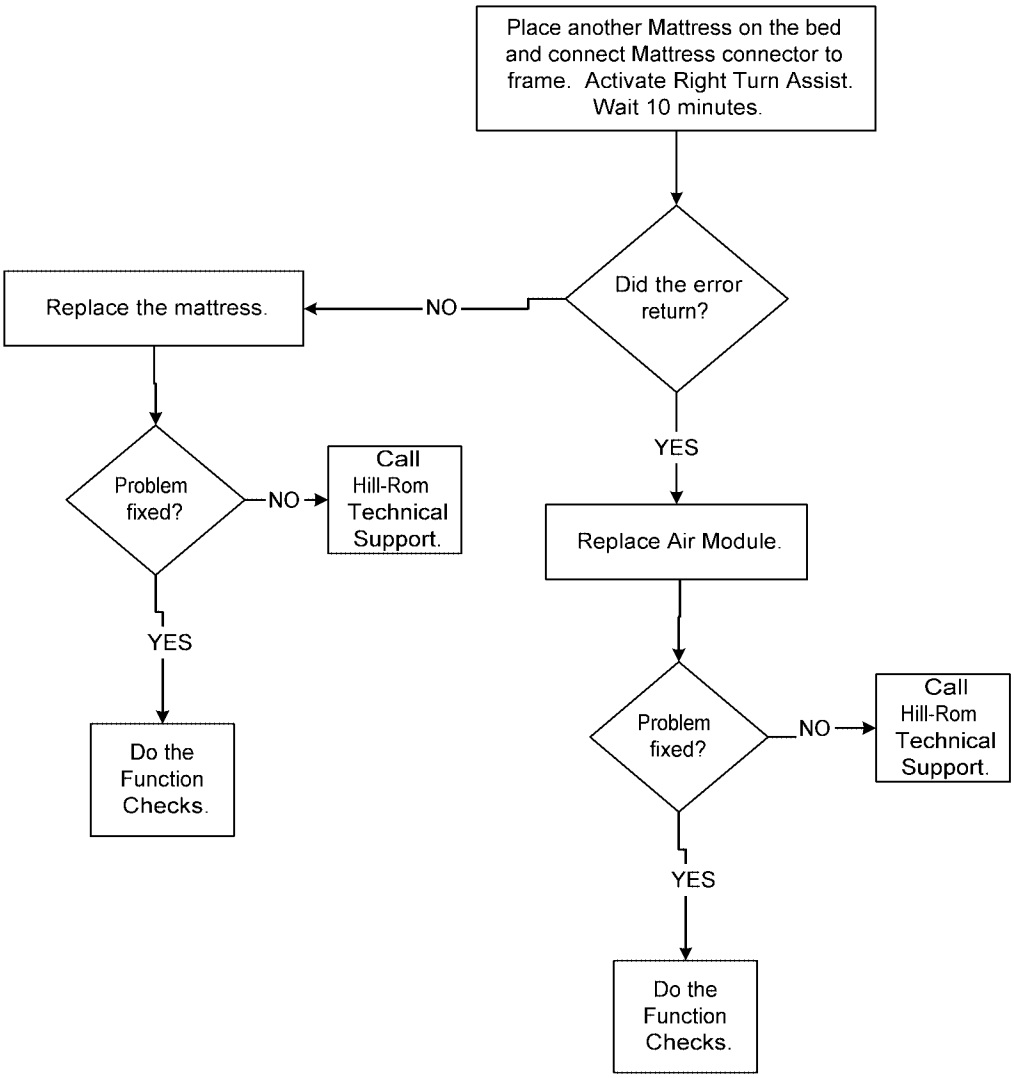
2.33 Not Reaching Seat Zone Pressure


Put another Mattress on the bed and connect Mattress connector to frame. Activate Max-Inflate. Wait 10 minutes.
Did the error return?
YES
NO
Mattress is defective.
Go to RAP 2.30 on page 2.42.
Is problem fixed?
NO
Call Hill-Rom Technical Support.
YES
Do the Function Checks.

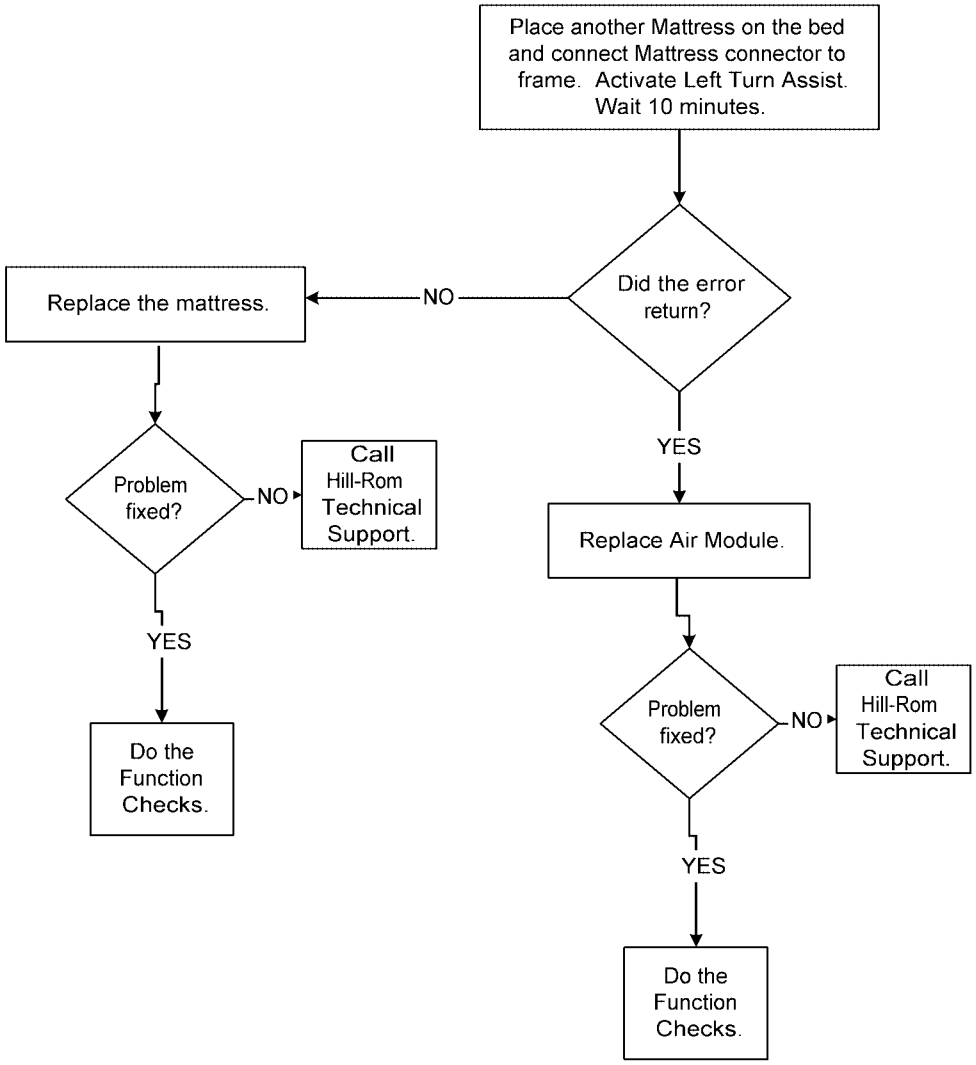
2.34 Not Reaching Foot Zone Pressure


Put another Mattress on the bed and connect Mattress connector to frame. Activate Max-Inflate. Wait 10 minutes.
Did the error return?
YES
NO
Mattress is defective.
Go to RAP 2.30 on page 2.42.
Is problem fixed?
NO
Call Hill-Rom Technical Support.
YES
Do the Function Checks.

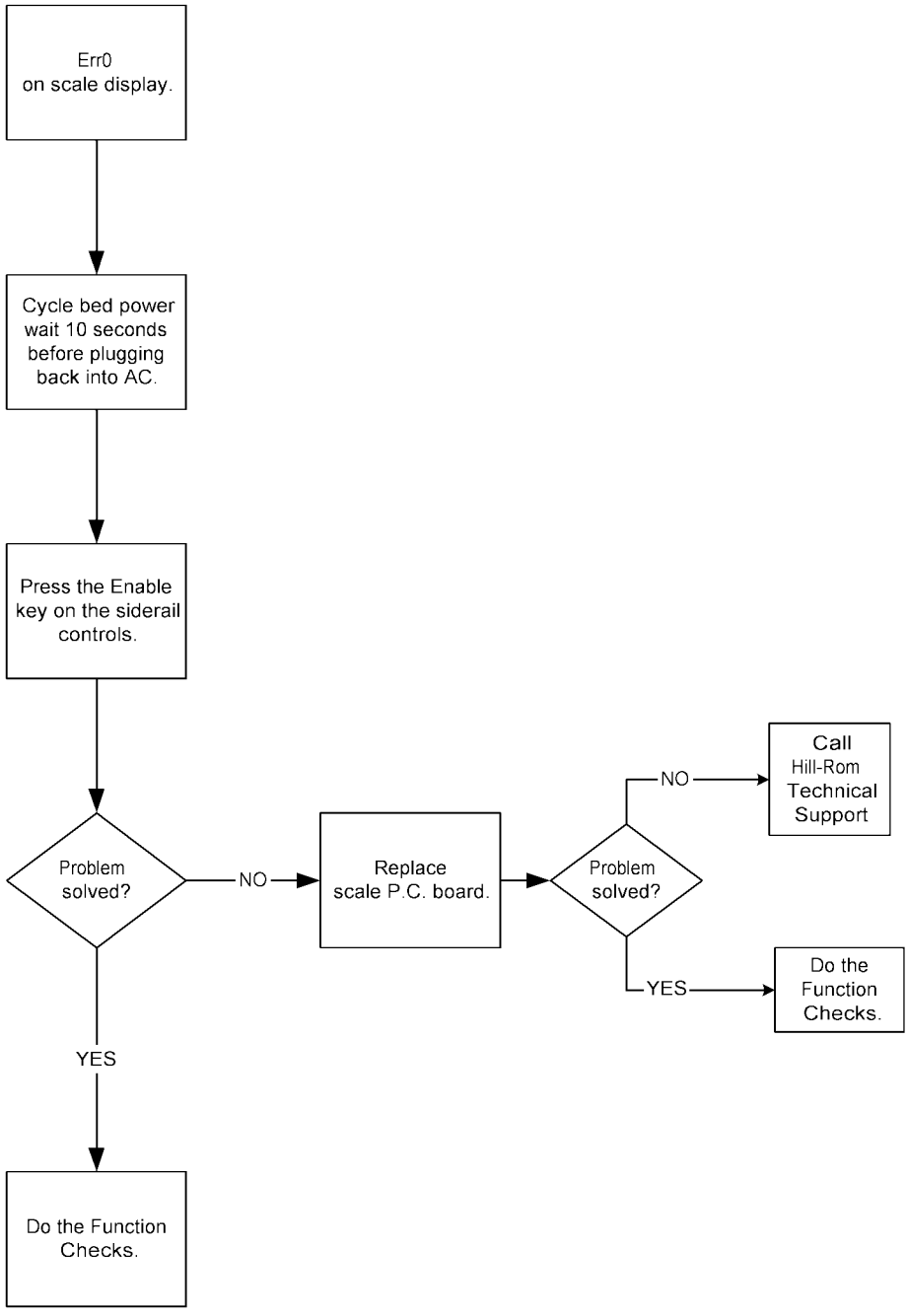
2.35 Not Reaching Right Turn Assist Pressure



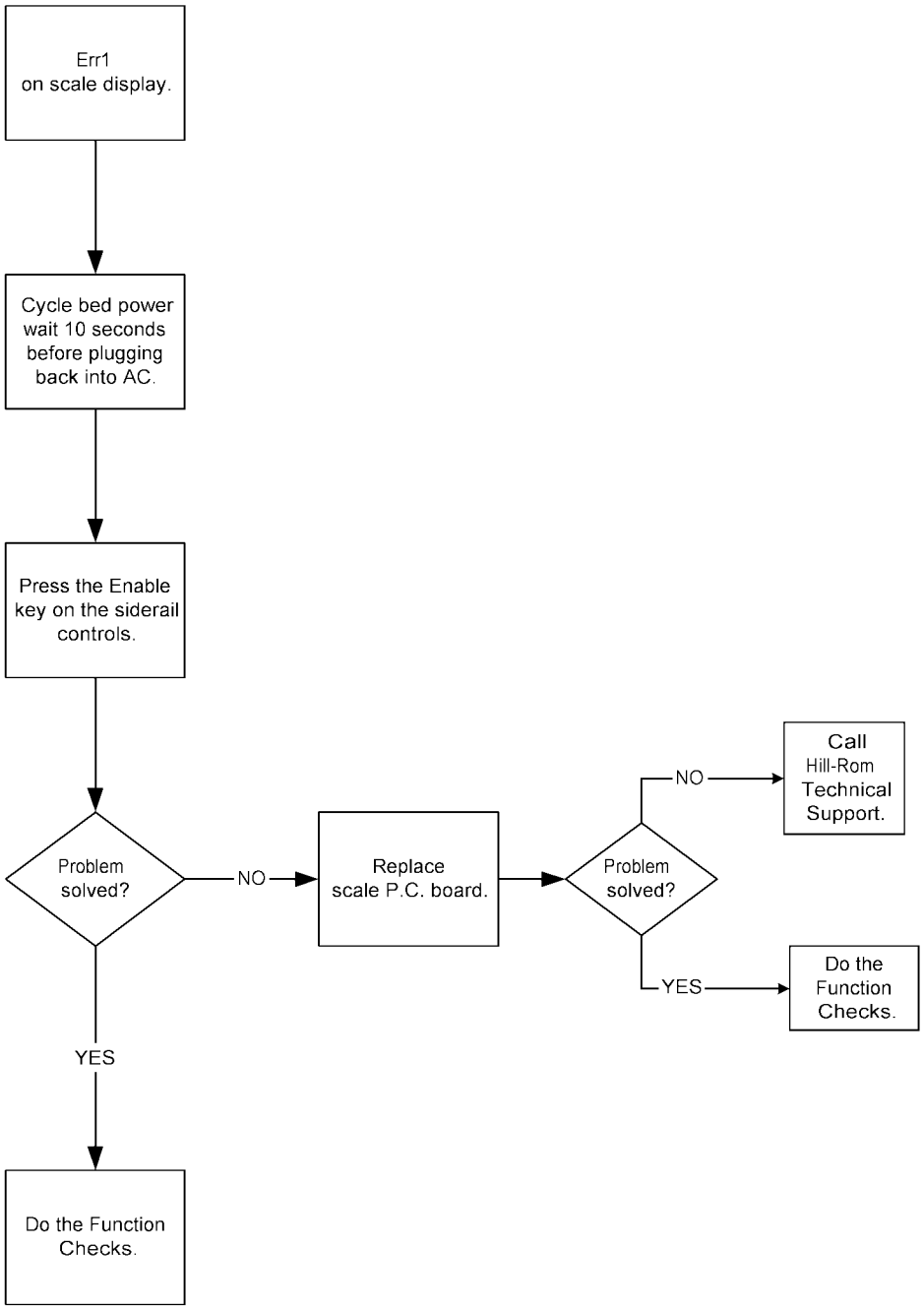
2.36 Not Reaching Left Turn Assist Pressure



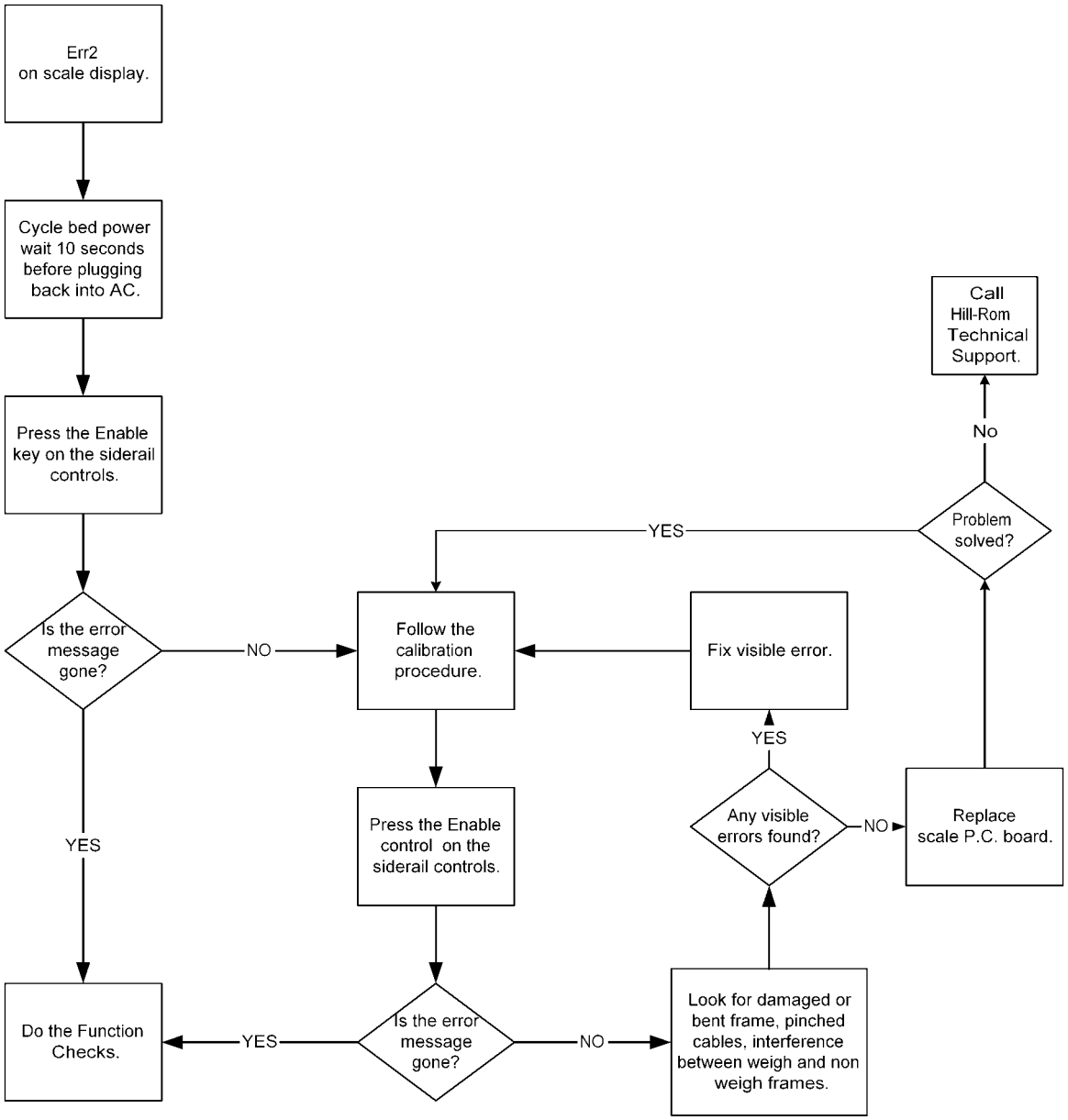
2.37 Scale Error 0



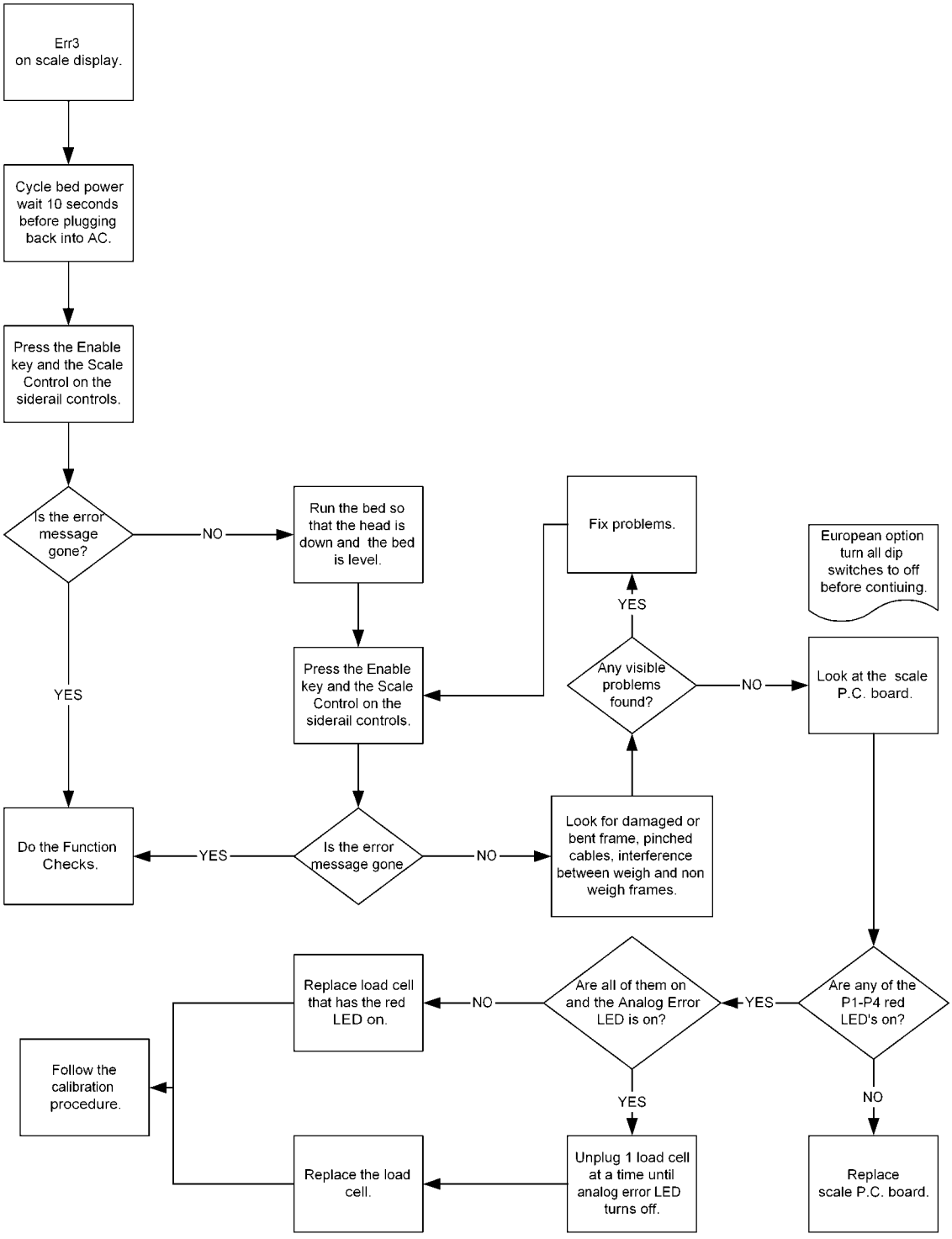
2.38 Scale Error 1



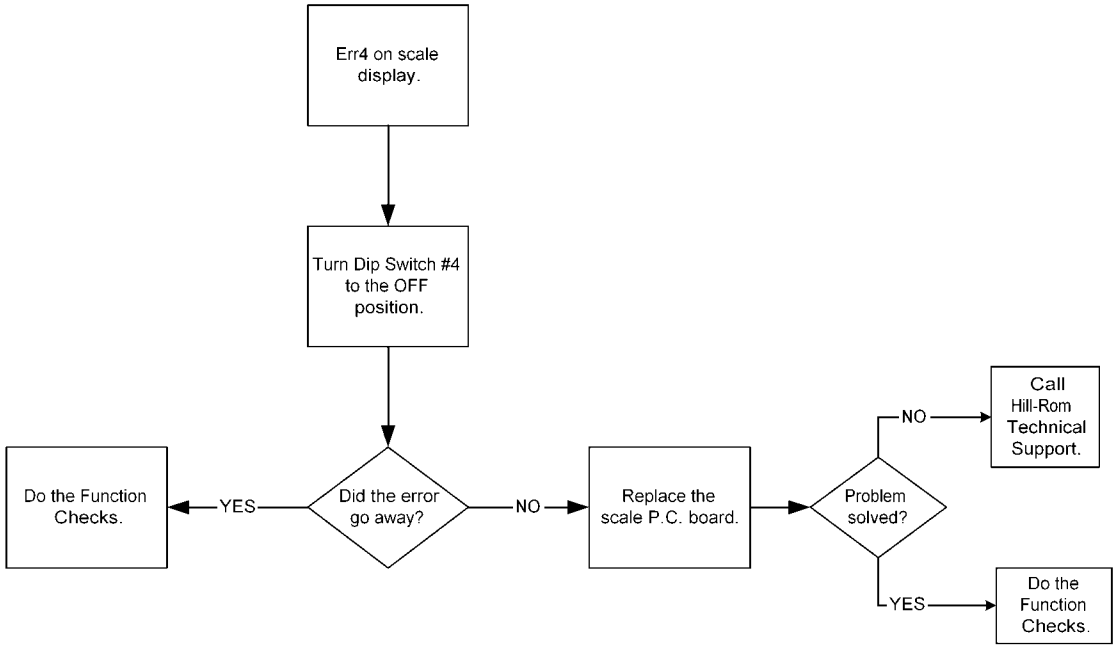
2.39 Scale Error 2

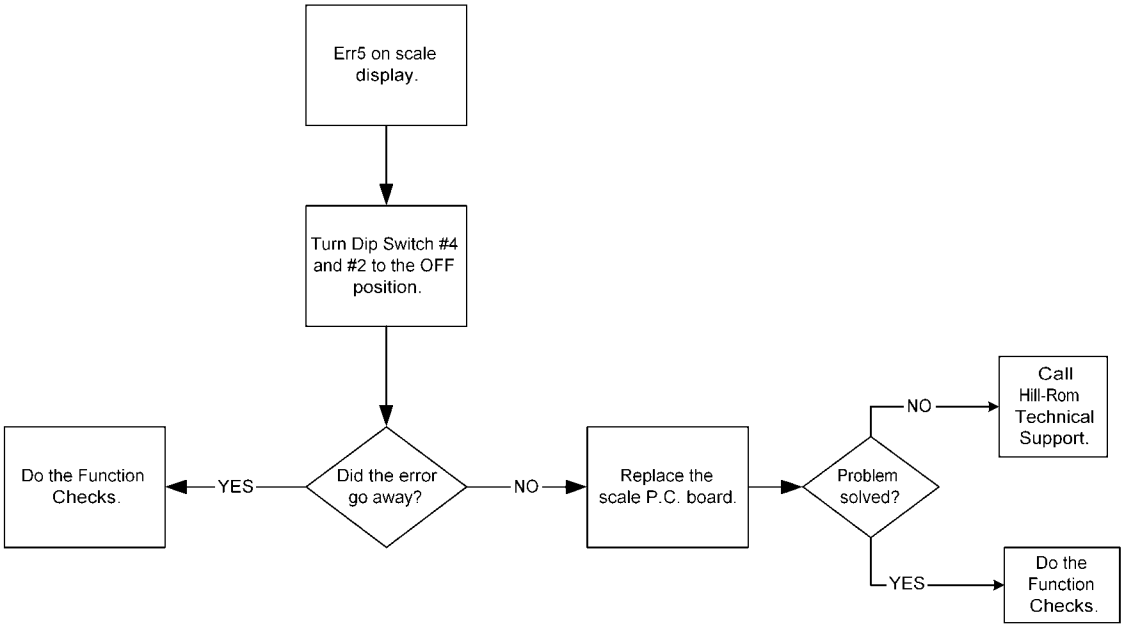


2.40 Scale Error 3

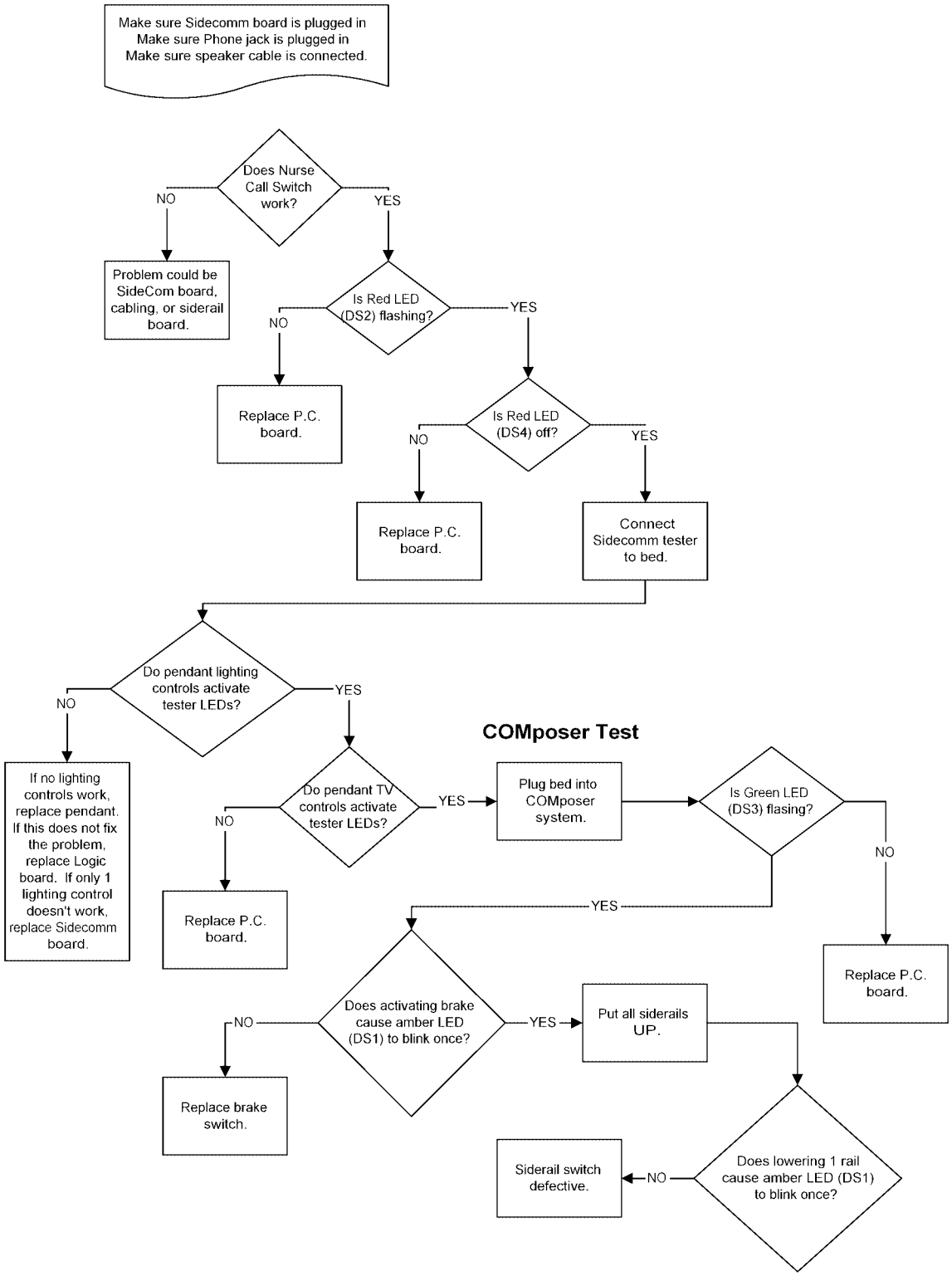

Err3
on scale display.
Cycle bed power wait 10 seconds before plugging back into AC.
Press the Enable key and the Scale Control on the siderail controls.
Is the error message gone?
NO
YES
Run the bed so that the head is down and the bed is level.
Press the Enable key and the Scale Control on the siderail controls.
Is the error message gone
YES
NO
Do the Function Checks.
Look for damaged or bent frame, pinched cables, interference between weigh and non weigh frames.
Fix problems.
YES
Any visible problems found?
NO
European option turn all dip switches to off before contiuing.
Look at the scale P.C. board.
Are any of the P1-P4 red LED's on?
YES
NO
Are all of them on and the Analog Error LED is on?
NO
YES
Replace load cell that has the red LED on.
Follow the calibration procedure.
Unplug 1 load cell at a time until analog error LED turns off.
Replace the load cell.
Replace scale P.C. board.

2.41 Scale Error 4 and 5 (European Scale Only)

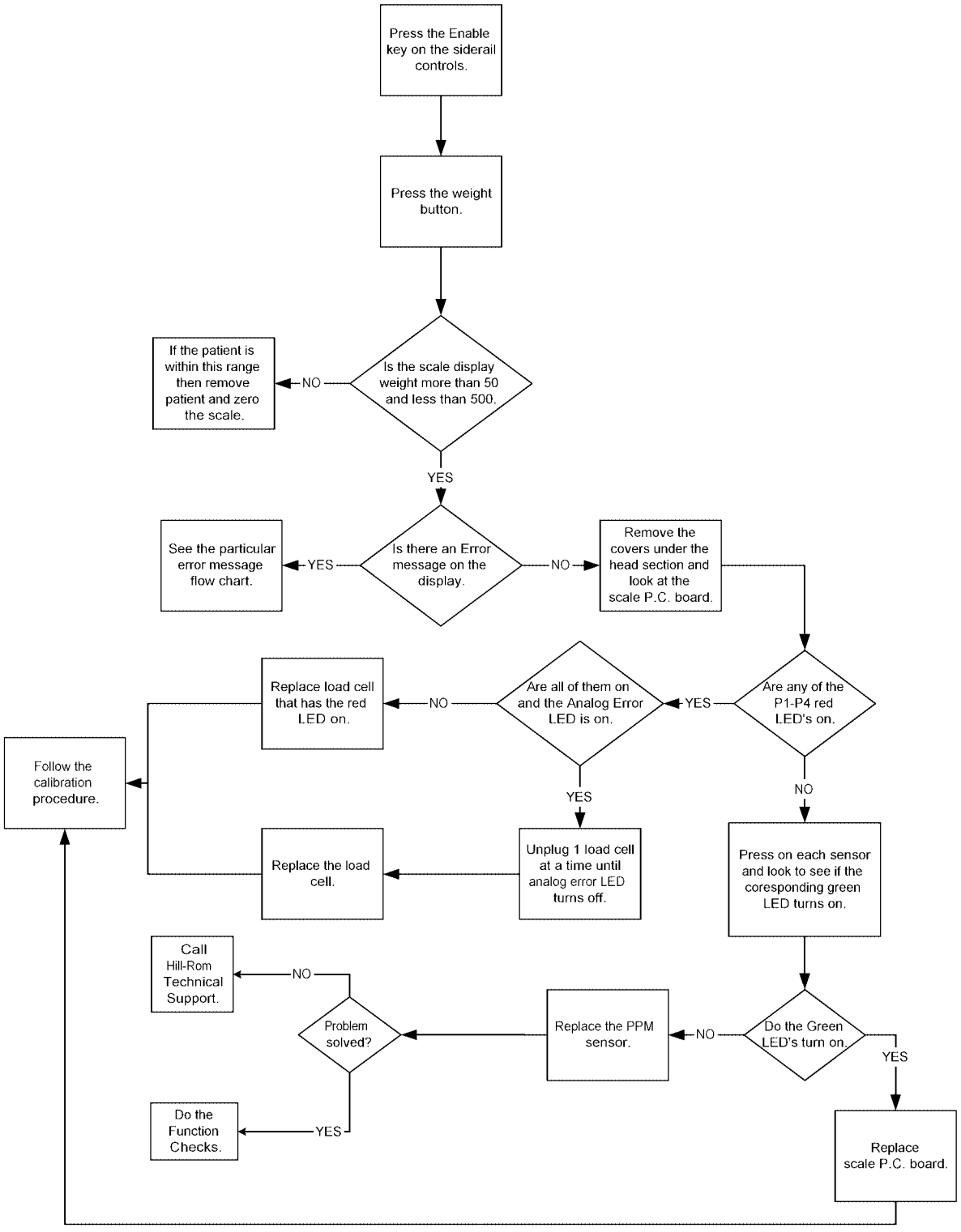




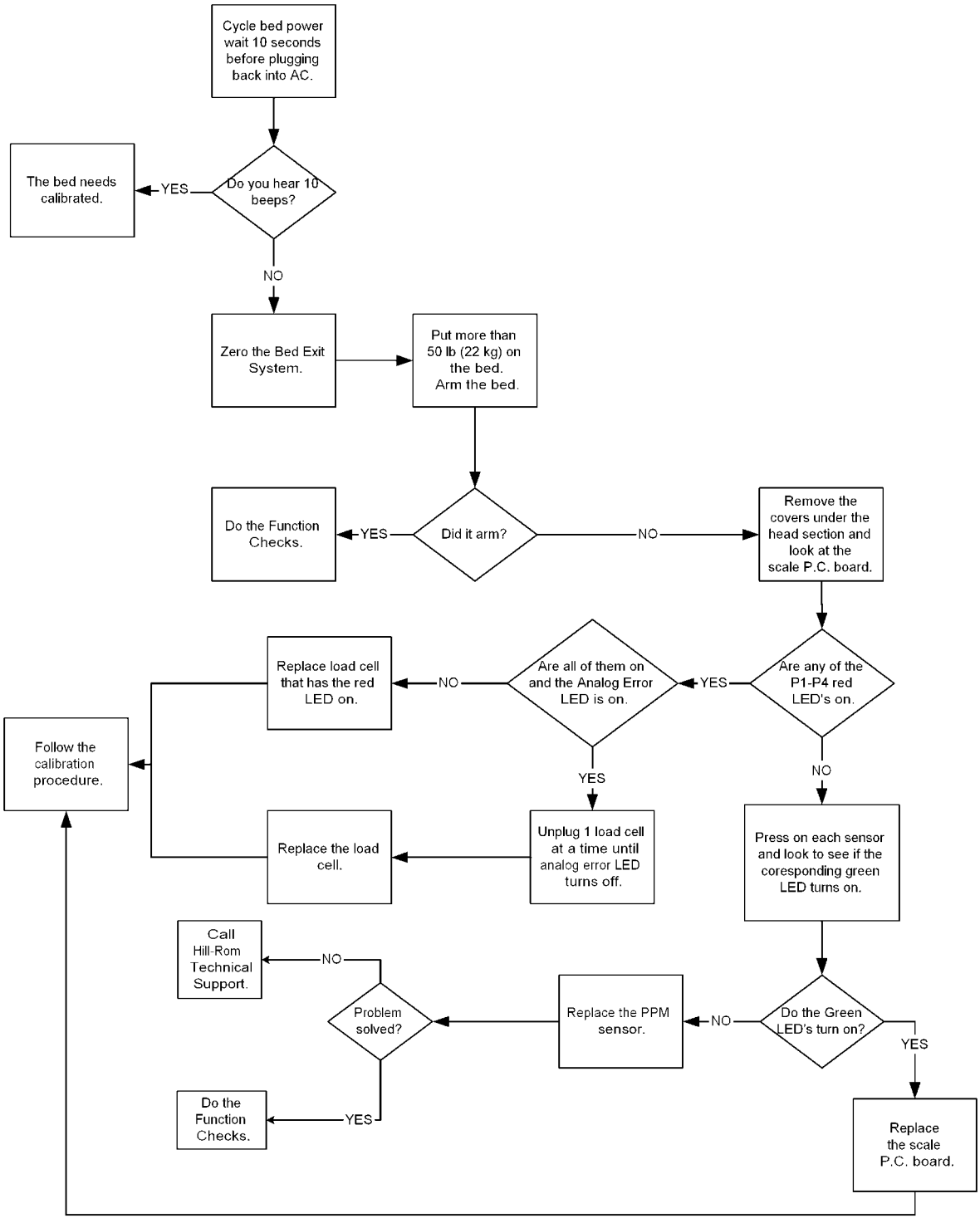
2.42 SideCom® Communication System


Make sure Sidecomm board is plugged in
Make sure Phone jack is plugged in
Make sure speaker cable is connected.
Does Nurse Call Switch work?
NO
YES
Problem could be SideCom board, cabling, or siderail board.
Is Red LED (DS2) flashing?
NO
YES
Replace P.C. board.
Is Red LED (DS4) off?
NO
YES
Replace P.C. board.
Connect Sidecomm tester to bed.
Do pendant lighting controls activate tester LEDs?
NO
YES
If no lighting controls work, replace pendant. If this does not fix the problem, replace Logic board. If only 1 lighting control doesn't work, replace Sidecomm board.
COMposer Test
Do pendant TV controls activate tester LEDs?
NO
YES
Replace P.C. board.
Plug bed into COMposer system.
Is Green LED (DS3) flasing?
NO
YES
Replace P.C. board.
Does activating brake cause amber LED (DS1) to blink once?
NO
YES
Replace brake switch.
Put all siderails UP.
Does lowering 1 rail cause amber LED (DS1) to blink once?
NO
Siderail switch defective.

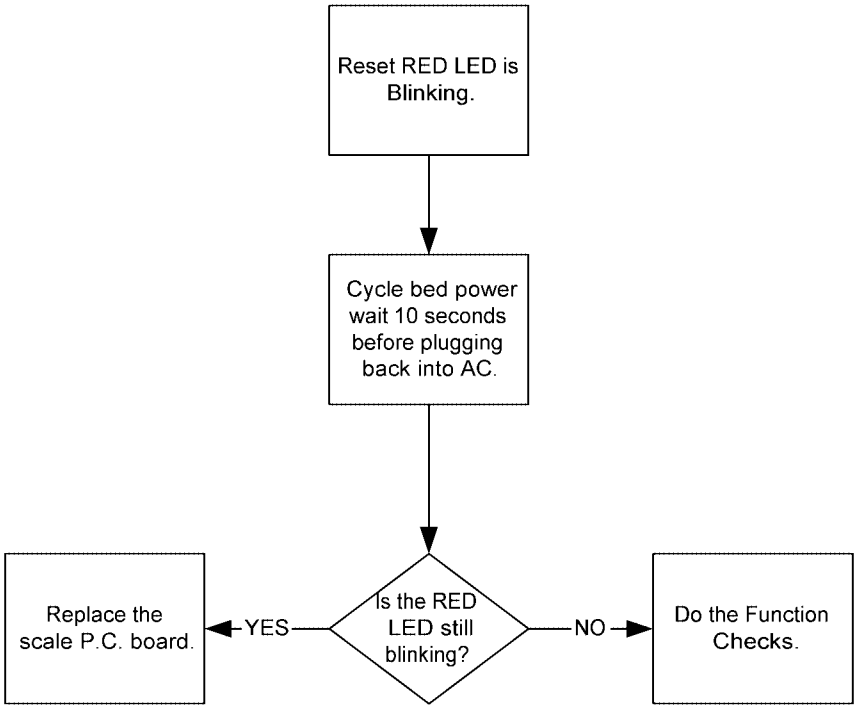
2.43 Patient Position Monitor System with Scale Display


Press the Enable key on the siderail controls.
Press the weight button.
Is the scale display weight more than 50 and less than 500.
NO
If the patient is within this range then remove patient and zero the scale.
YES
Is there an Error message on the display.
YES
See the particular error message flow chart.
NO
Remove the covers under the head section and look at the scale P.C. board.
Are any of the P1-P4 red LED's on.
YES
Are all of them on and the Analog Error LED is on.
NO
Replace load cell that has the red LED on.
YES
Unplug 1 load cell at a time until analog error LED turns off.
Replace the load cell.
NO
Press on each sensor and look to see if the coresponding green LED turns on.
Follow the calibration procedure.
Do the Green LED's turn on.
NO
Replace the PPM sensor.
YES
Replace scale P.C. board.
Problem solved?
NO
Call Hill-Rom Technical Support.
YES
Do the Function Checks.

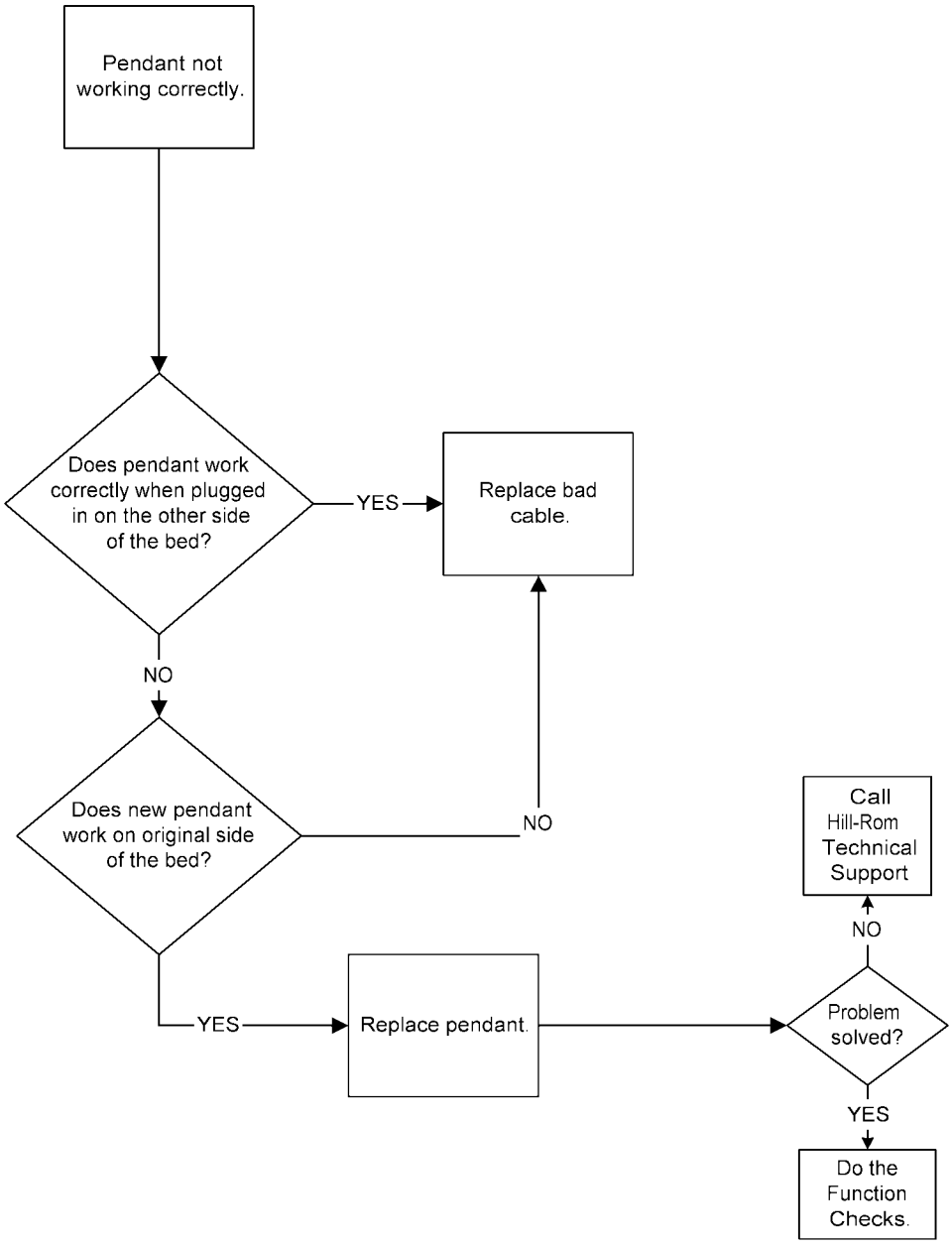
2.44 Patient Position Monitor without Scale Display


Cycle bed power wait 10 seconds before plugging back into AC.
Do you hear 10 beeps?
YES
The bed needs calibrated.
NO
Zero the Bed Exit System.
Put more than 50 lb (22 kg) on the bed. Arm the bed.
Did it arm?
YES
Do the Function Checks.
NO
Remove the covers under the head section and look at the scale P.C. board.
Are any of the P1-P4 red LED's on.
YES
Are all of them on and the Analog Error LED is on.
NO
Replace load cell that has the red LED on.
YES
Unplug 1 load cell at a time until analog error LED turns off.
Replace the load cell.
Follow the calibration procedure.
NO
Press on each sensor and look to see if the coresponding green LED turns on.
Do the Green LED's turn on?
NO
Replace the PPM sensor.
YES
Replace the scale P.C. board.
Problem solved?
NO
Call Hill-Rom Technical Support.
YES
Do the Function Checks.

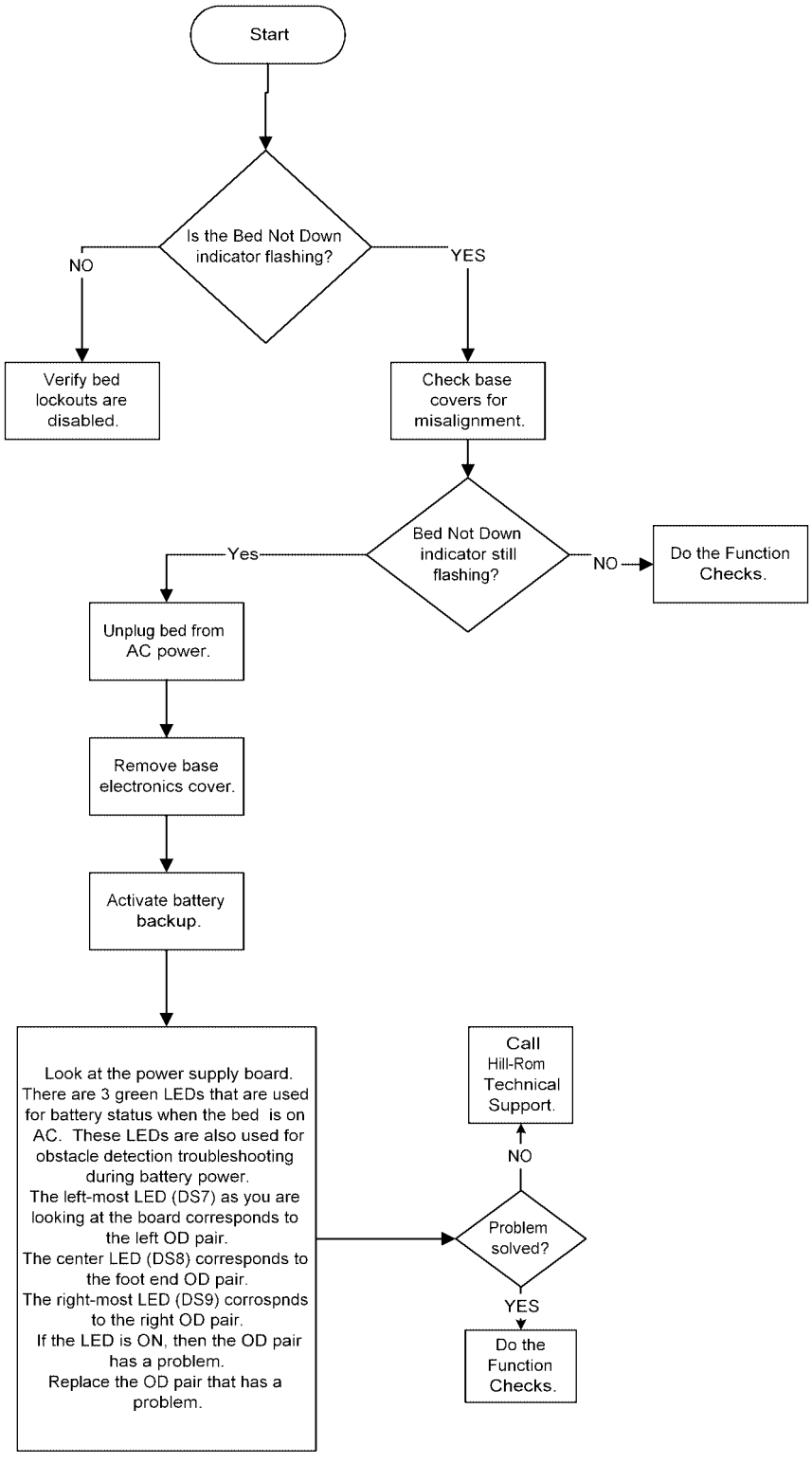
2.45 CRC Error


Reset RED LED is Blinking.
Cycle bed power wait 10 seconds before plugging back into AC.
Is the RED LED still blinking?
YES
Replace the scale P.C. board.
NO
Do the Function Checks.

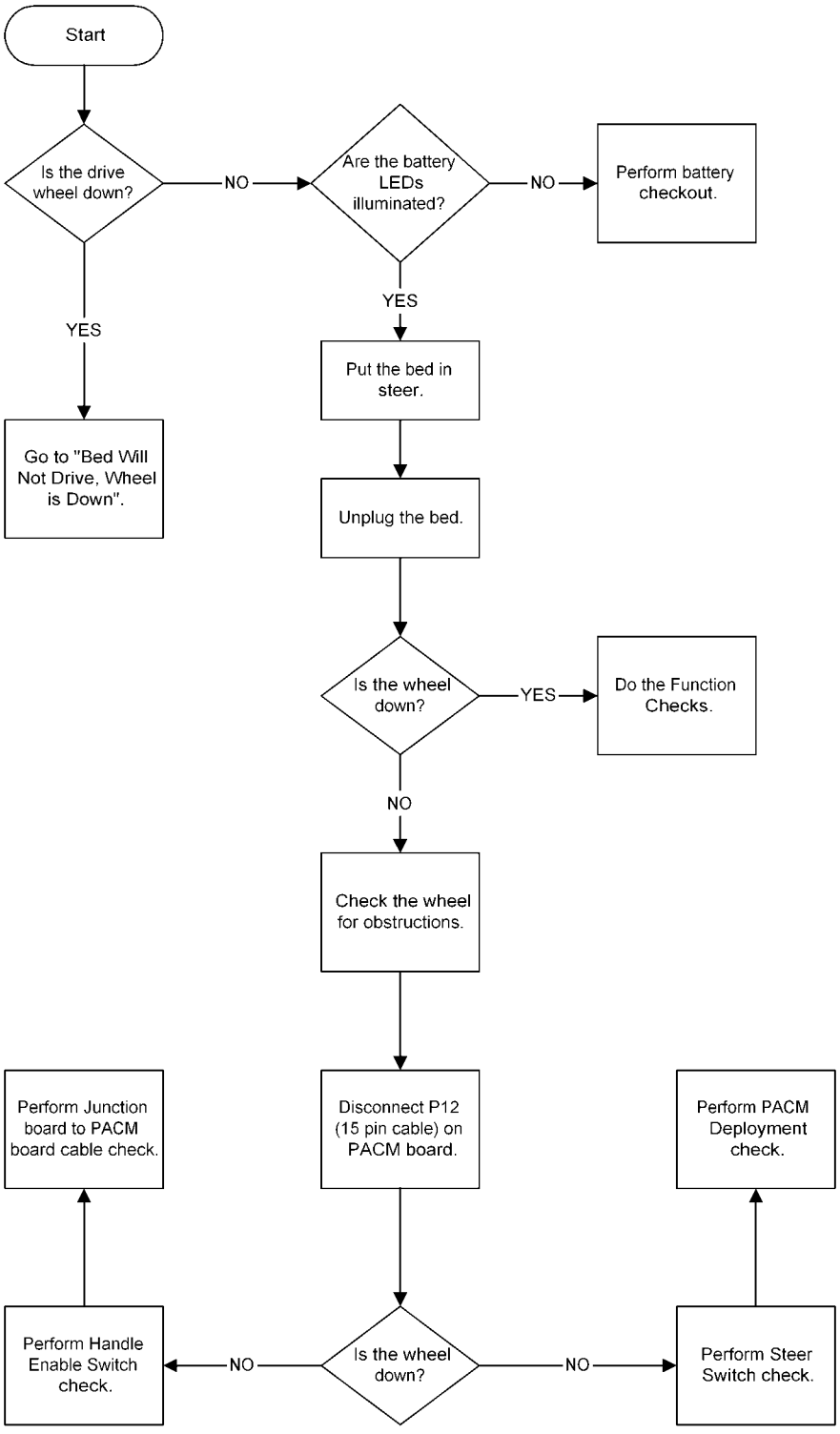
2.46 Patient Pendant



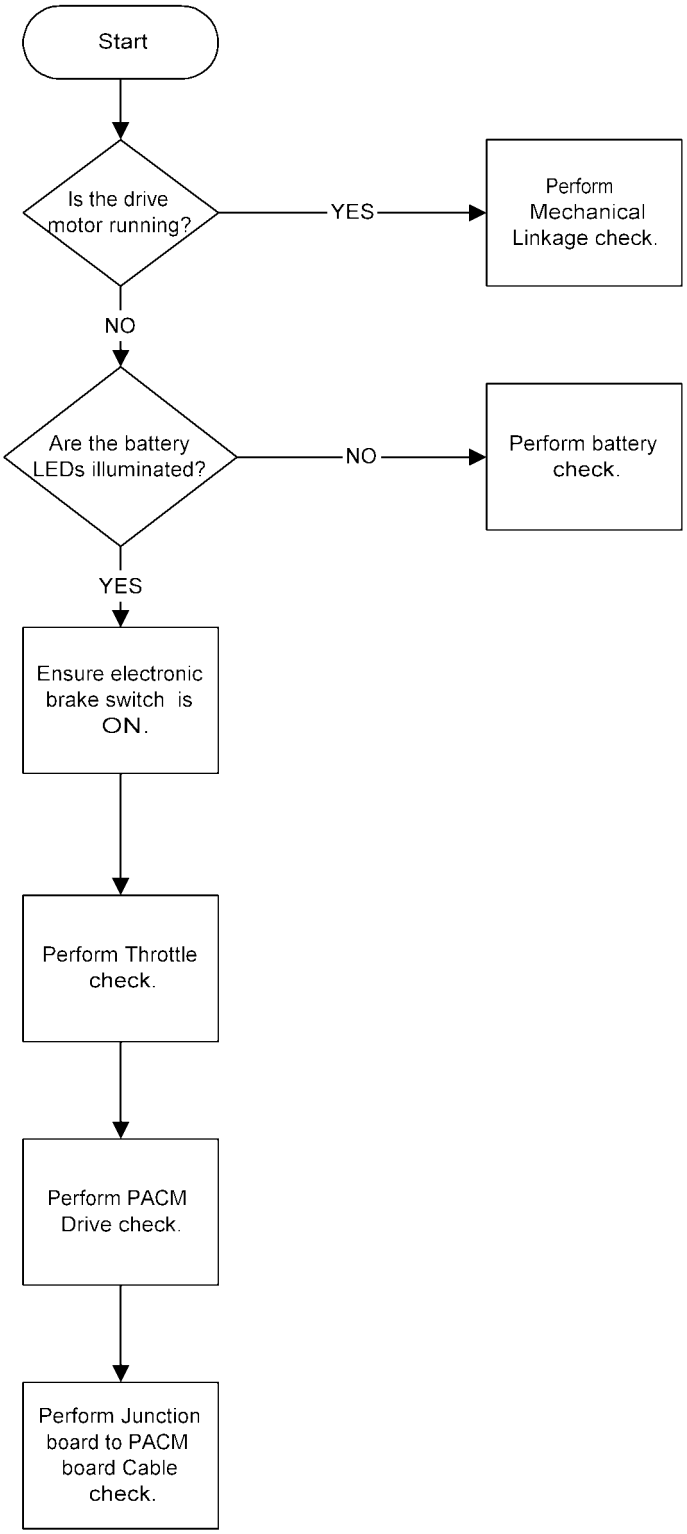
2.47 Obstacle Detection


Start
Is the Bed Not Down indicator flashing?
NO
YES
Verify bed lockouts are disabled.
Check base covers for misalignment.
Bed Not Down indicator still flashing?
Yes
NO
Do the Function Checks.
Unplug bed from AC power.
Remove base electronics cover.
Activate battery backup.
Look at the power supply board. There are 3 green LEDs that are used for battery status when the bed is on AC. These LEDs are also used for obstacle detection troubleshooting during battery power. The left-most LED (DS7) as you are looking at the board corresponds to the left OD pair. The center LED (DS8) corresponds to the foot end OD pair. The right-most LED (DS9) corrospnds to the right OD pair. If the LED is ON, then the OD pair has a problem. Replace the OD pair that has a problem.
Call Hill-Rom Technical Support.
NO
Problem solved?
YES
Do the Function Checks.

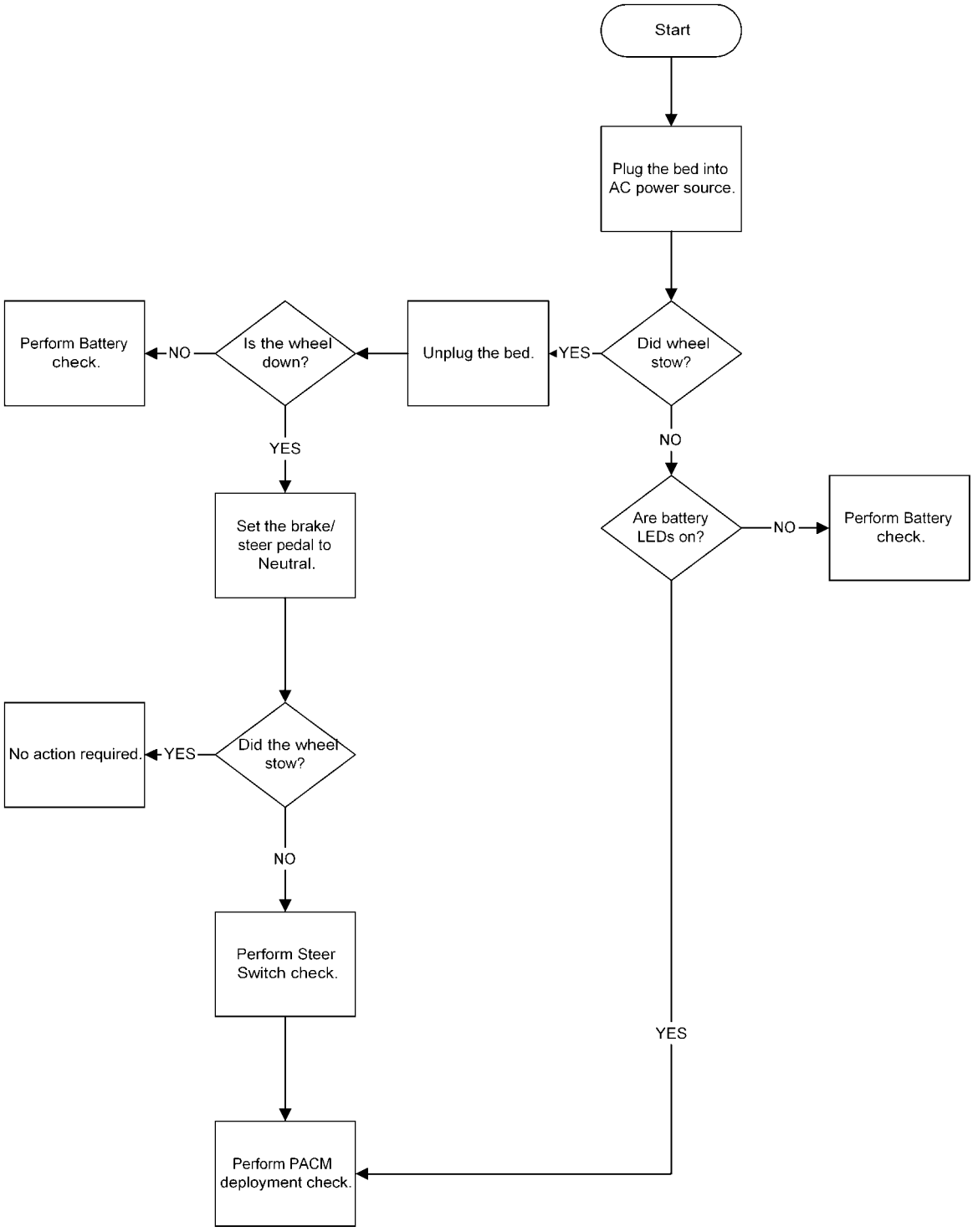
2.48 Bed Will Not Drive (IntelliDrive® Transport System)



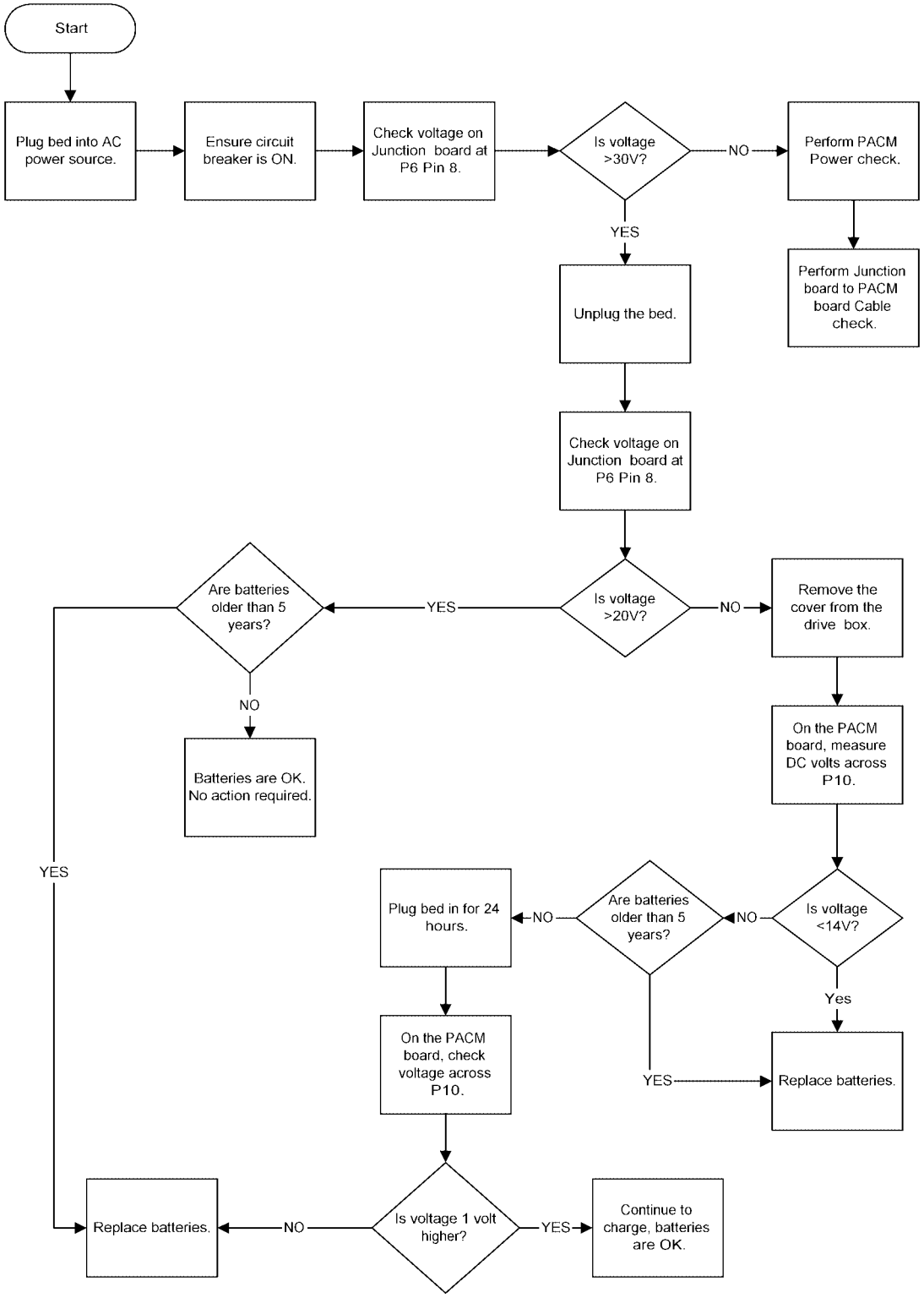
2.49 Bed Will Not Drive, Wheel Is Down (IntelliDrive® Transport System)



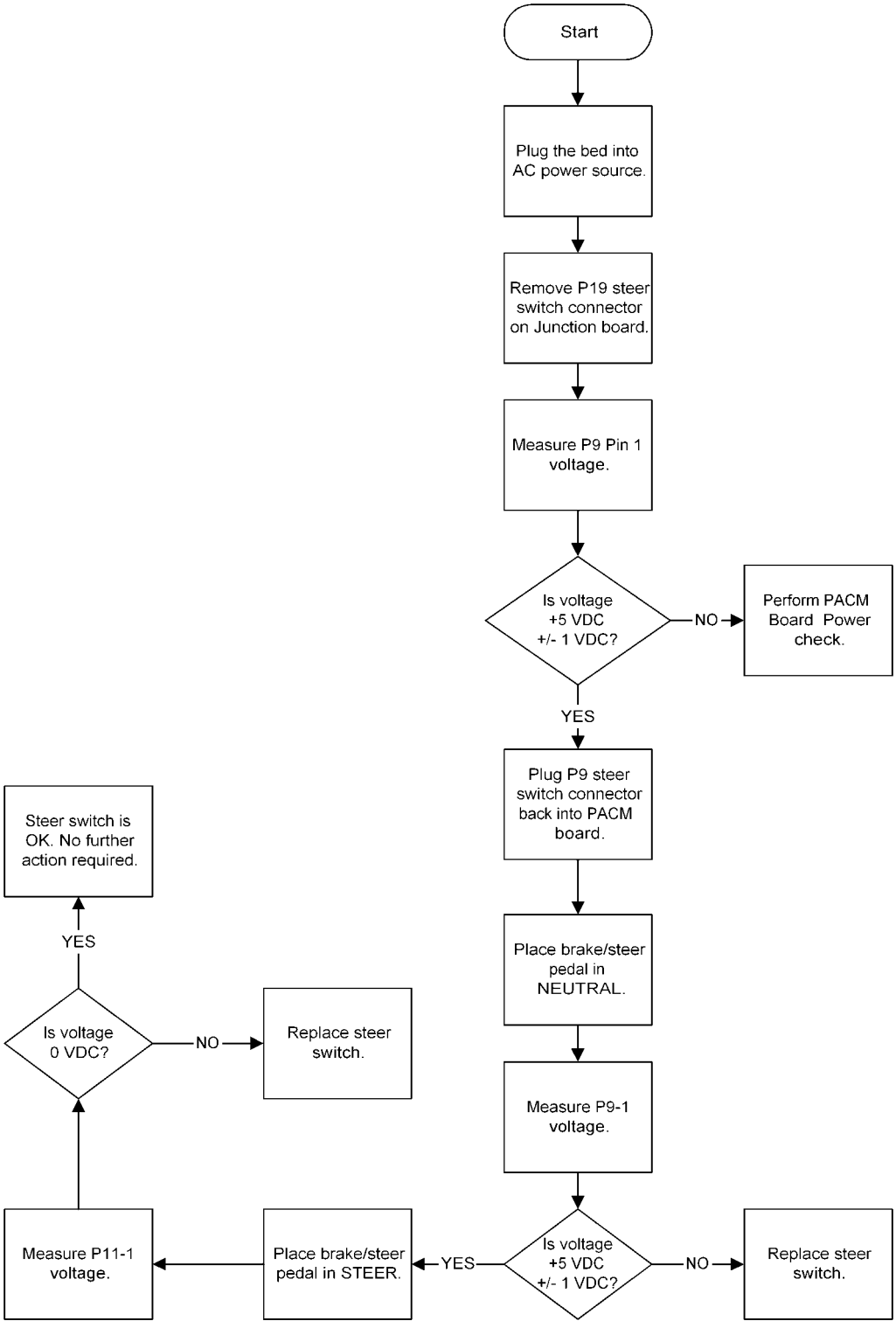
2.50 Wheel Will Not Stow (IntelliDrive® Transport System)



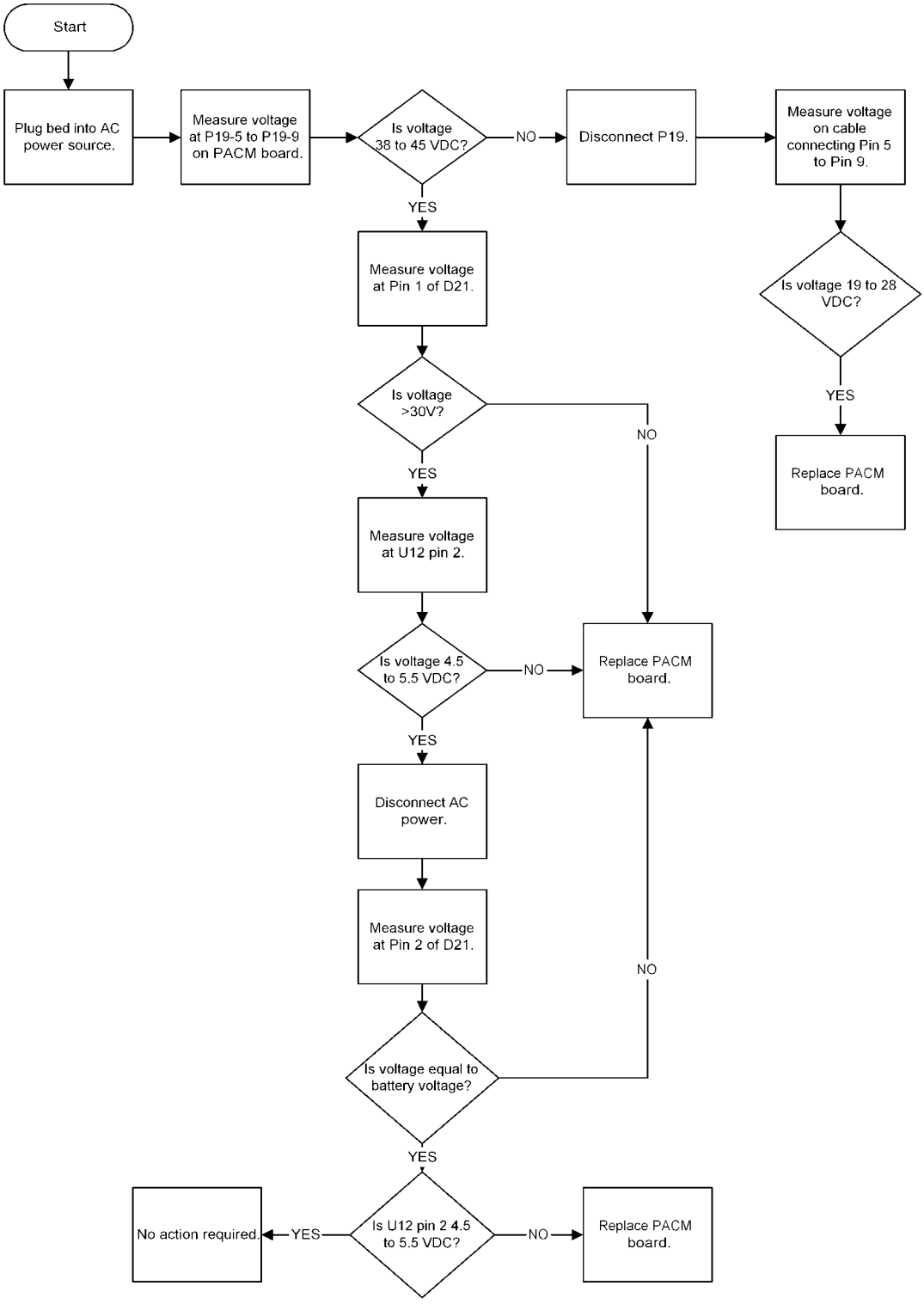
2.51 Battery Check (IntelliDrive® Transport System)



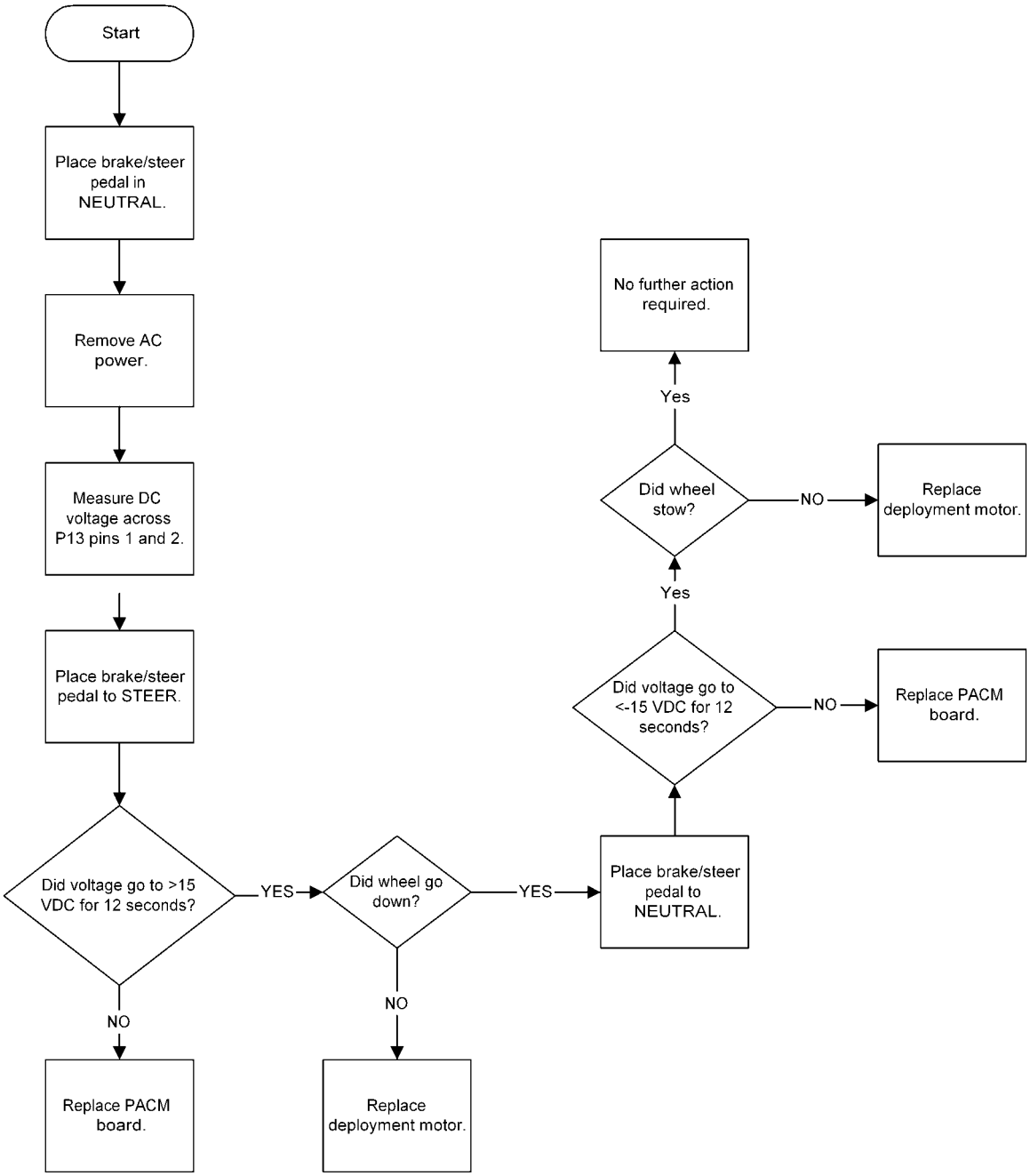
2.52 Steer Switch Check (IntelliDrive® Transport System)


Start
Plug the bed into AC power source.
Remove P19 steer switch connector on Junction board.
Measure P9 Pin 1 voltage.
Is voltage +5 VDC +/- 1 VDC?
NO
Perform PACM Board Power check.
YES
Plug P9 steer switch connector back into PACM board.
Place brake/steer pedal in NEUTRAL.
Measure P9-1 voltage.
Is voltage +5 VDC +/- 1 VDC?
YES
Place brake/steer pedal in STEER.
Measure P11-1 voltage.
Is voltage 0 VDC?
NO
Replace steer switch.
YES
Steer switch is OK. No further action required.
NO
Replace steer switch.

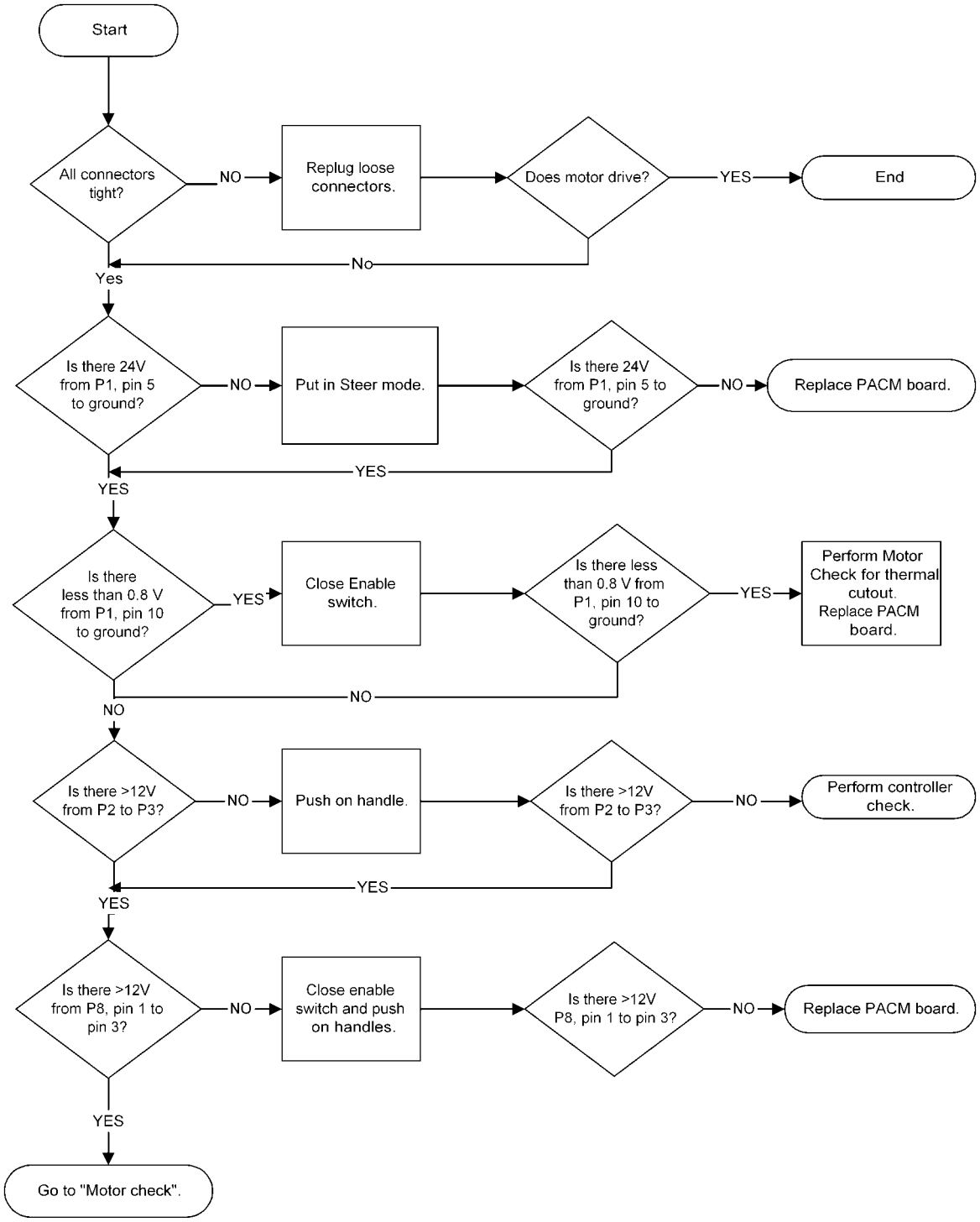
2.53 PACM Board Power Check (IntelliDrive® Transport System)



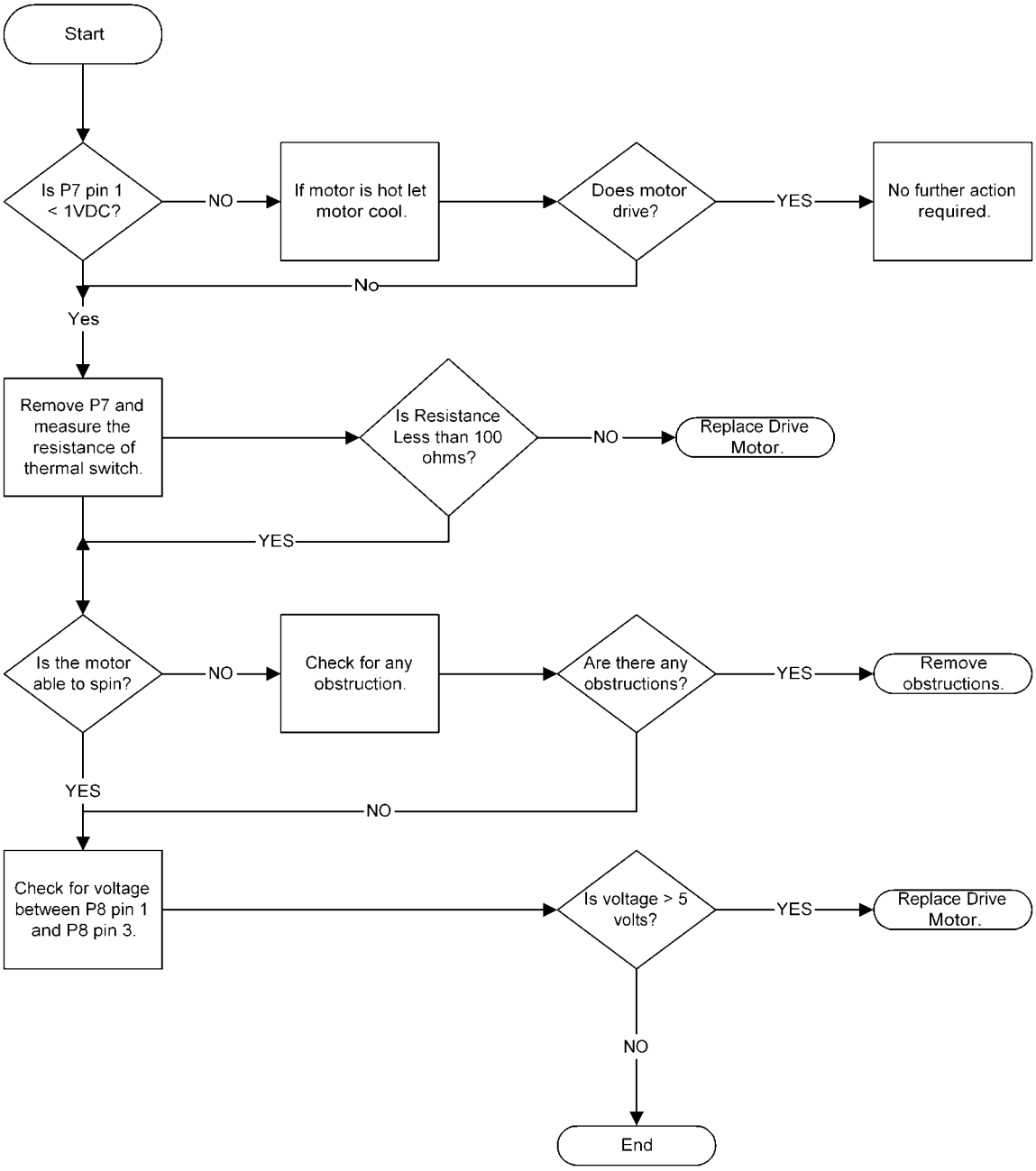
2.54 PACM Board Deployment Check (IntelliDrive® Transport System)



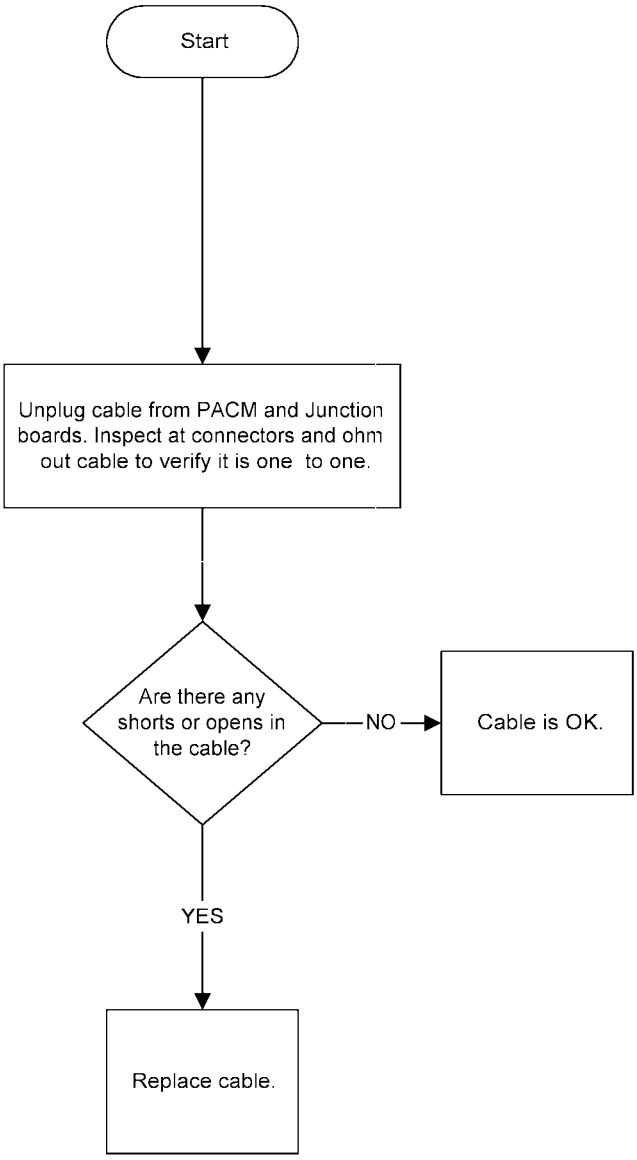
2.55 PACM Board Drive Check (IntelliDrive® Transport System)



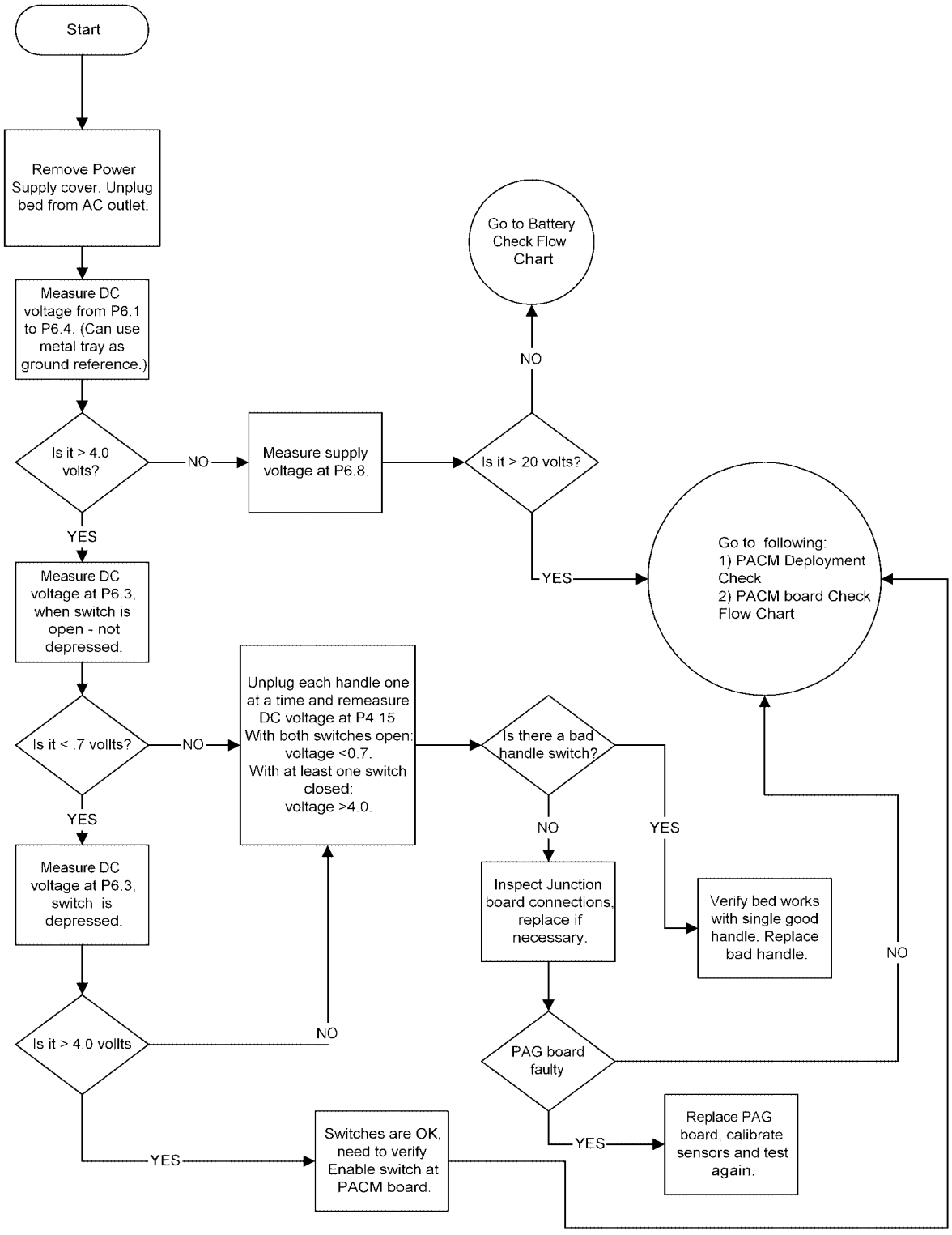
2.56 Motor Check (IntelliDrive® Transport System)



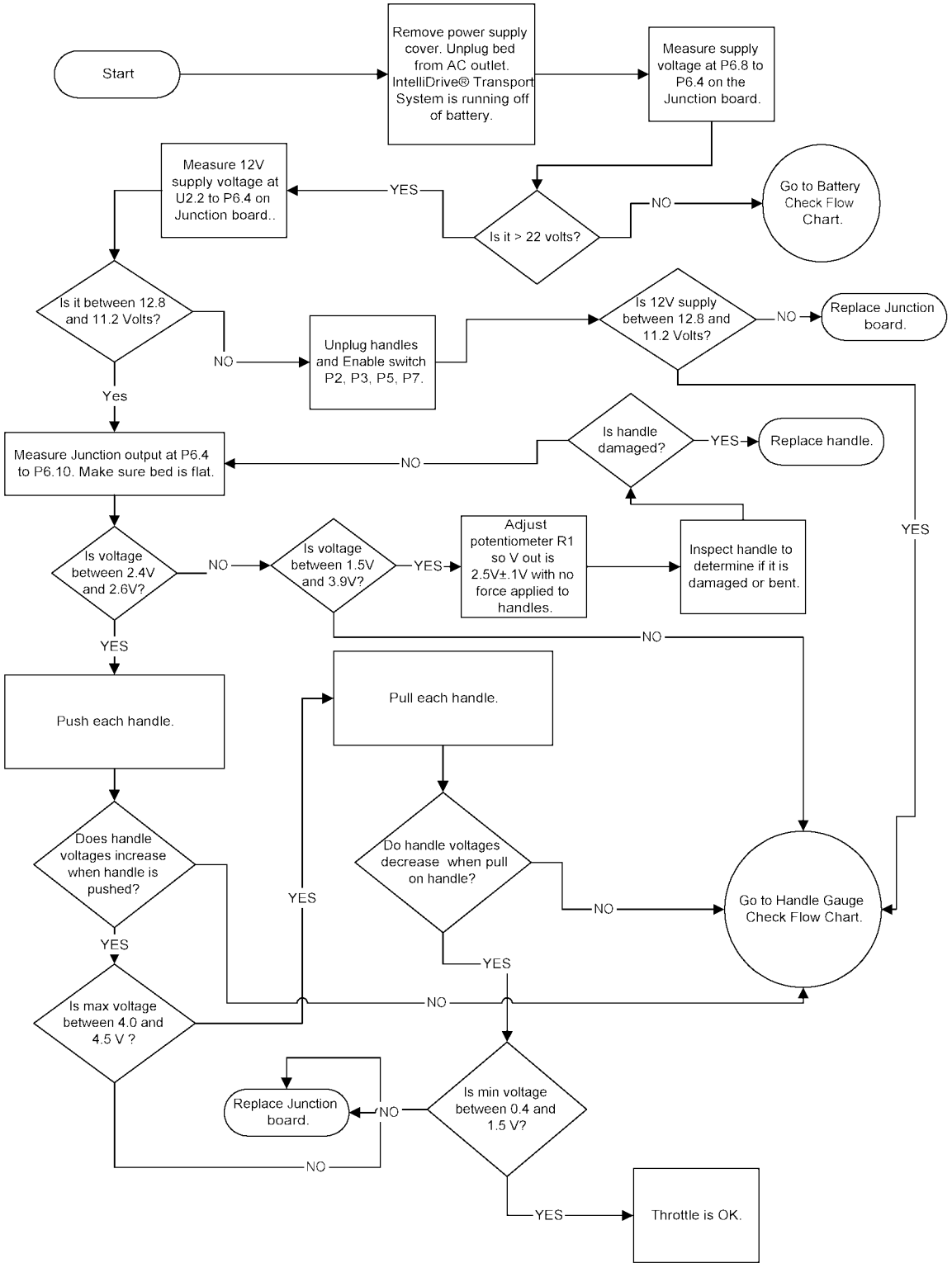
2.57 PACM to Junction Board Cable Check (IntelliDrive® Transport System)


Start
Unplug cable from PACM and Junction boards. Inspect at connectors and ohm out cable to verify it is one to one.
Are there any shorts or opens in the cable?
NO
Cable is OK.
YES
Replace cable.

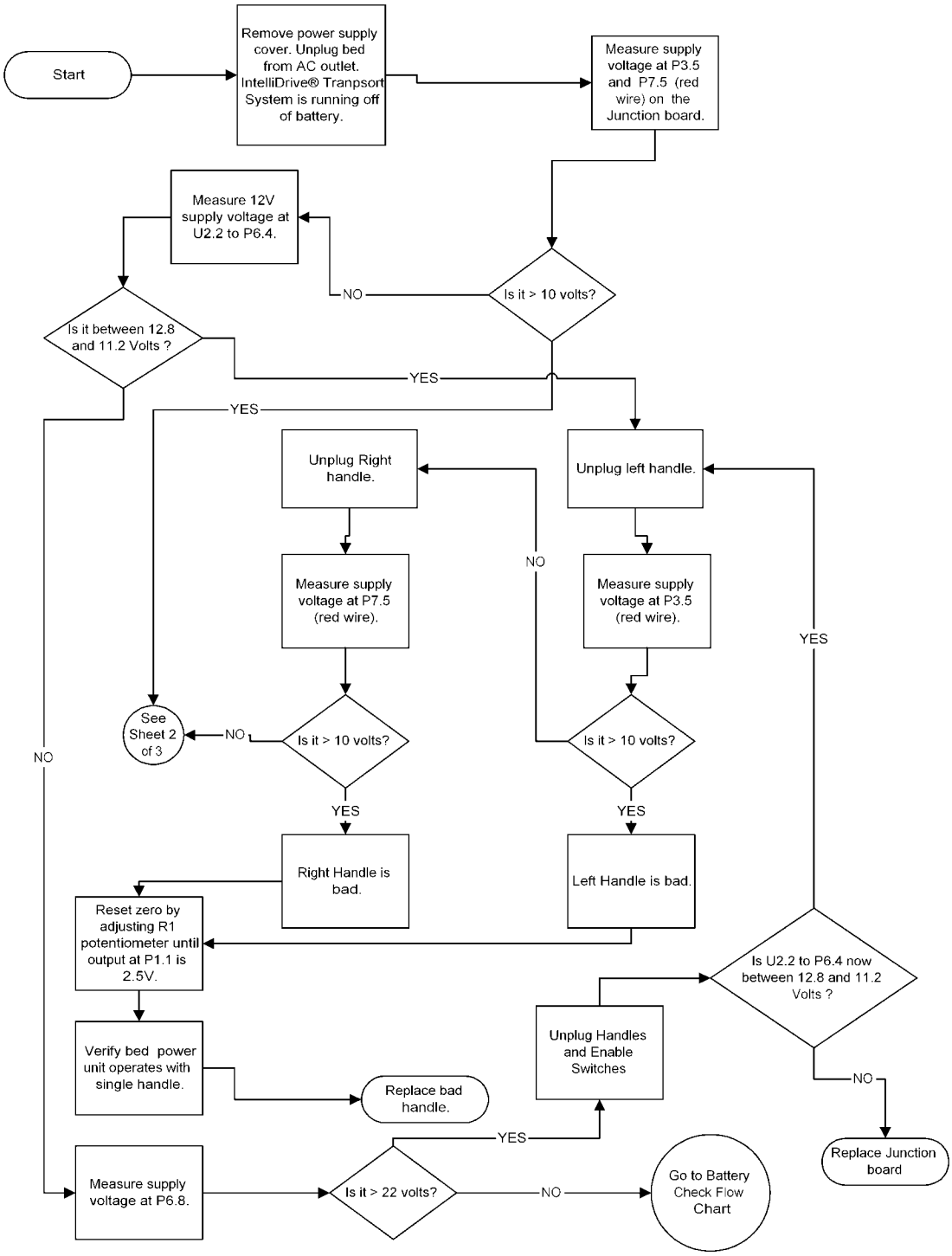
2.58 Handle Enable Switch Check (IntelliDrive® Transport System)


Start
Remove Power Supply cover. Unplug bed from AC outlet.
Measure DC voltage from P6.1 to P6.4. (Can use metal tray as ground reference.)
Is it > 4.0 volts?
NO
Measure supply voltage at P6.8.
Is it > 20 volts?
NO
Go to Battery Check Flow Chart
YES
Go to following:
1) PACM Deployment Check
2) PACM board Check Flow Chart
YES
Measure DC voltage at P6.3, when switch is open - not depressed.
Is it < .7 vollts?
NO
Unplug each handle one at a time and remeasure DC voltage at P4.15.
With both switches open: voltage <0.7.
With at least one switch closed: voltage >4.0.
Is there a bad handle switch?
YES
NO
YES
Measure DC voltage at P6.3, switch is depressed.
Inspect Junction board connections, replace if necessary.
Verify bed works with single good handle. Replace bad handle.
NO
Is it > 4.0 vollts
NO
PAG board faulty
YES
Switches are OK, need to verify Enable switch at PACM board.
Replace PAG board, calibrate sensors and test again.

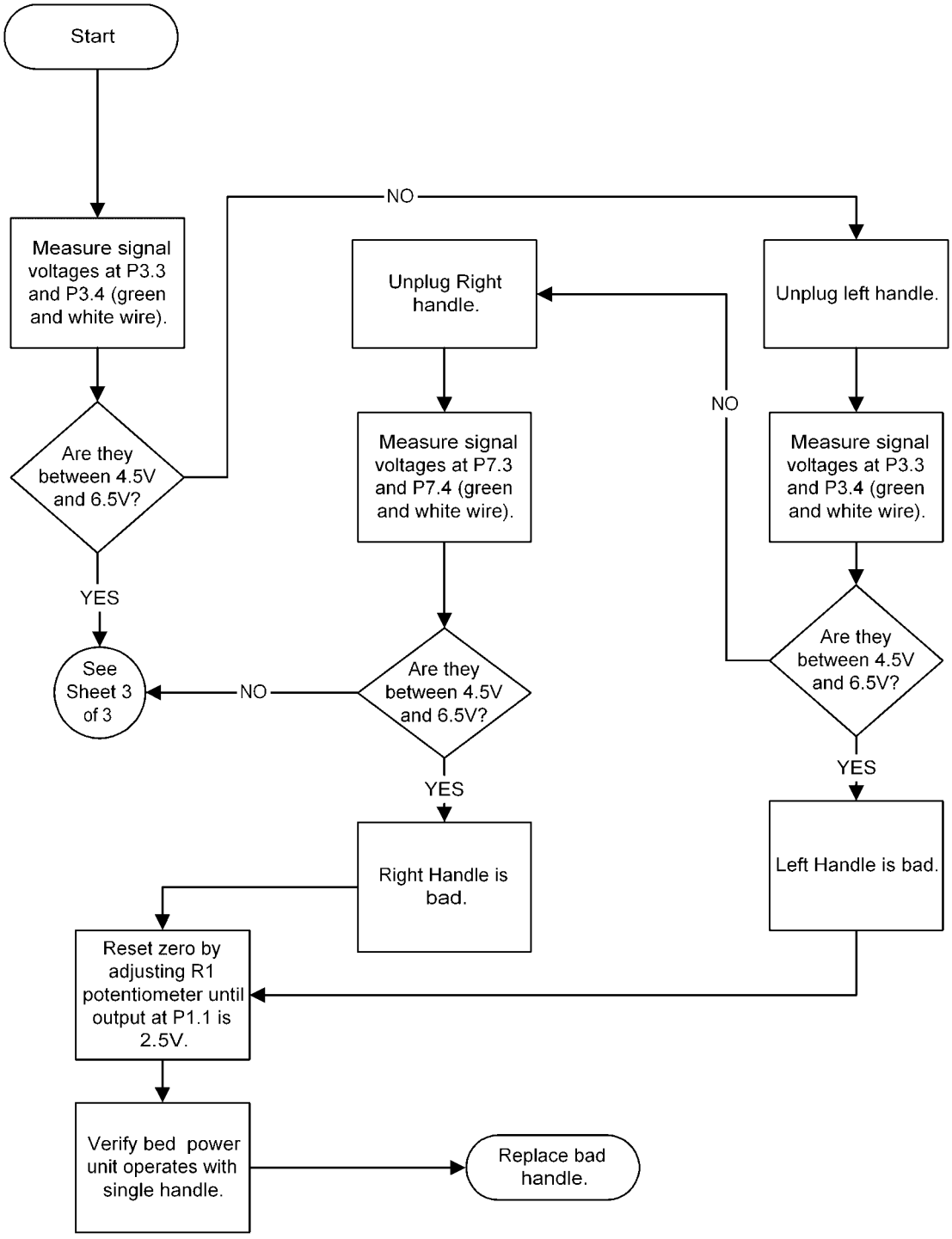
2.59 Throttle Check (IntelliDrive® Transport System)


Start
Remove power supply cover. Unplug bed from AC outlet. IntelliDrive® Transport System is running off of battery.
Measure supply voltage at P6.8 to P6.4 on the Junction board.
Is it > 22 volts?
YES
NO
Measure 12V supply voltage at U2.2 to P6.4 on Junction board..
Go to Battery Check Flow Chart.
Is it between 12.8 and 11.2 Volts?
NO
Yes
Unplug handles and Enable switch P2, P3, P5, P7.
Is 12V supply between 12.8 and 11.2 Volts?
NO
Replace Junction board.
YES
Measure Junction output at P6.4 to P6.10. Make sure bed is flat.
NO
Is handle damaged?
YES
Replace handle.
Is voltage between 2.4V and 2.6V?
NO
Is voltage between 1.5V and 3.9V?
YES
Adjust potentiometer R1 so V out is 2.5V±.1V with no force applied to handles.
Inspect handle to determine if it is damaged or bent.
YES
NO
Push each handle.
Pull each handle.
Does handle voltages increase when handle is pushed?
YES
Do handle voltages decrease when pull on handle?
NO
YES
Go to Handle Gauge Check Flow Chart.
Is max voltage between 4.0 and 4.5 V ?
NO
YES
Replace Junction board.
NO
Is min voltage between 0.4 and 1.5 V?
NO
YES
Throttle is OK.

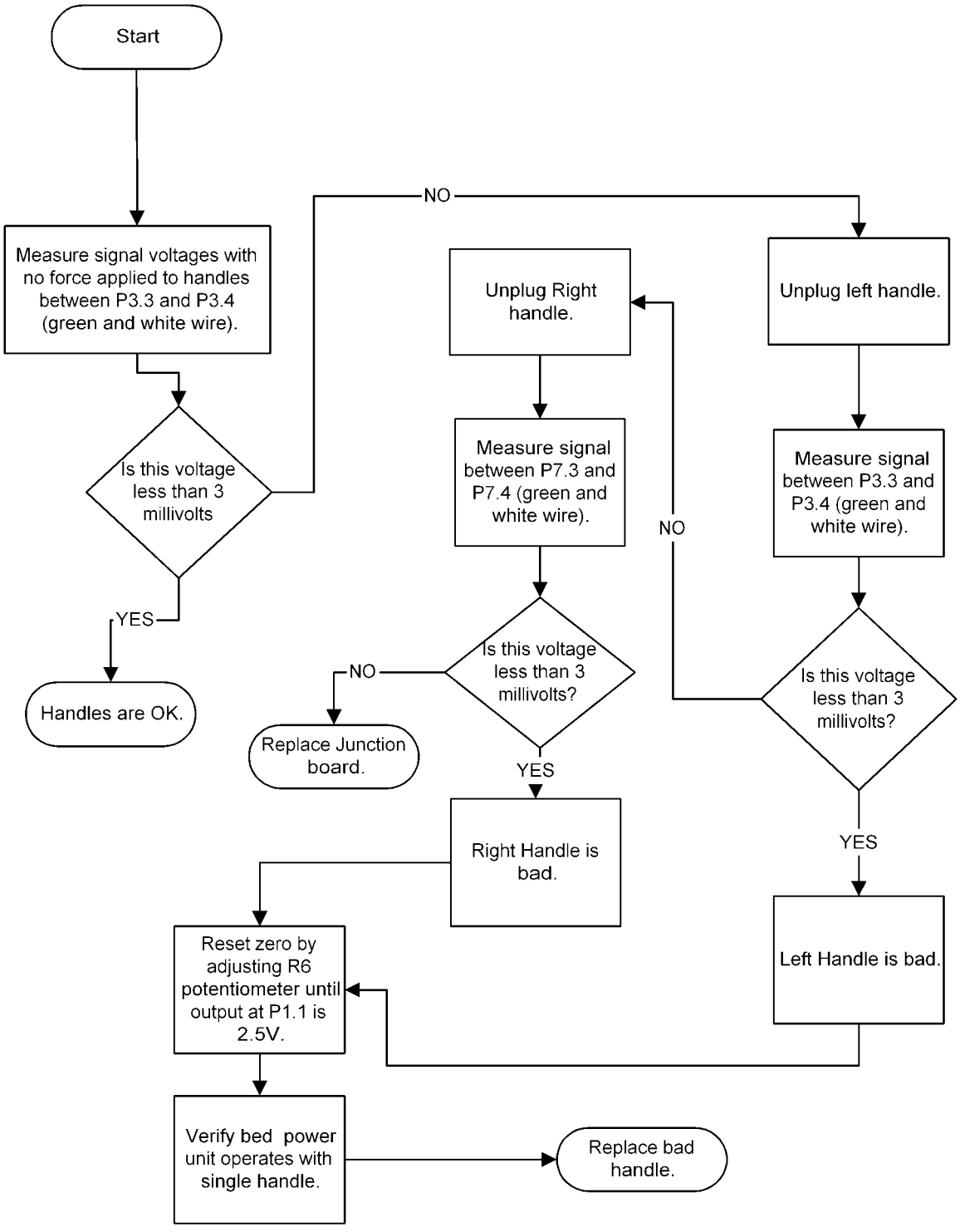
2.60 Handle Gauge Check (IntelliDrive® Transport System) (Sheet 1 of 3)


Start
Remove power supply cover. Unplug bed from AC outlet. IntelliDrive® Tranpsort System is running off of battery.
Measure supply voltage at P3.5 and P7.5 (red wire) on the Junction board.
Measure 12V supply voltage at U2.2 to P6.4.
NO
Is it > 10 volts?
Is it between 12.8 and 11.2 Volts ?
YES
YES
Unplug Right handle.
Unplug left handle.
NO
Measure supply voltage at P7.5 (red wire).
Measure supply voltage at P3.5 (red wire).
YES
See Sheet 2 of 3
NO
Is it > 10 volts?
Is it > 10 volts?
NO
YES
YES
Right Handle is bad.
Left Handle is bad.
Reset zero by adjusting R1 potentiometer until output at P1.1 is 2.5V.
Is U2.2 to P6.4 now between 12.8 and 11.2 Volts ?
Unplug Handles and Enable Switches
Verify bed power unit operates with single handle.
Replace bad handle.
NO
YES
Replace Junction board
Measure supply voltage at P6.8.
Is it > 22 volts?
NO
Go to Battery Check Flow Chart

2.61 Handle Gauge Check (IntelliDrive® Transport System) (Sheet 2 of 3)


Start
Measure signal voltages at P3.3 and P3.4 (green and white wire).
Are they between 4.5V and 6.5V?
NO
YES
See Sheet 3 of 3
Unplug Right handle.
Measure signal voltages at P7.3 and P7.4 (green and white wire).
Are they between 4.5V and 6.5V?
NO
YES
Right Handle is bad.
Unplug left handle.
Measure signal voltages at P3.3 and P3.4 (green and white wire).
Are they between 4.5V and 6.5V?
NO
YES
Left Handle is bad.
Reset zero by adjusting R1 potentiometer until output at P1.1 is 2.5V.
Verify bed power unit operates with single handle.
Replace bad handle.

2.62 Handle Gauge Check (IntelliDrive® Transport System) (Sheet 3 of 3)


Start
Measure signal voltages with no force applied to handles between P3.3 and P3.4 (green and white wire).
Is this voltage less than 3 millivolts
NO
YES
Handles are OK.
Unplug Right handle.
Measure signal between P7.3 and P7.4 (green and white wire).
Is this voltage less than 3 millivolts?
NO
Replace Junction board.
YES
Right Handle is bad.
Unplug left handle.
Measure signal between P3.3 and P3.4 (green and white wire).
Is this voltage less than 3 millivolts?
NO
YES
Left Handle is bad.
Reset zero by adjusting R6 potentiometer until output at P1.1 is 2.5V.
Verify bed power unit operates with single handle.
Replace bad handle.

2.63 Controller Check—IntelliDrive® Transport System

1. Remove the drive box from the bed.
2. Place the drive box on wooden supports so the drive belt will not touch the ground when it deploys.
3. Connect the bed cables running into the box.
4. Locate DS 1 on the PACM board.
5. Observe the following on DS 1:
   - LED DS 1 is off—The controller is either not powered or is not getting a KS 1 signal (which should be present if the wheel is deployed).
   - LED DS 1 is on and steady—Controller is operating correctly.
   - LED DS 1flashing—Record the flash pattern. Use the brake and steer pedal to cycle the drive belt. Observe the LED DS 1. If LED DS 1 is still flashing, refer to table 2-6 on page 2-75 for error codes.

Table 2-6. Controller Error Codes

Flash Code	Description	Possible Cause
¤ ¤	Thermal Cutback	1) Make sure the bed temperature is within the normal operating range 58°F to 103°F (15-40 degrees C). 2) Check for mechanical binding or item stuck in drive train or belt. 3) Replace Controller.
¤ ¤¤	Throttle Fault 1	1) Make sure the controller is getting approximately 2.5 V input when the handles are neutral, 4.0 V when they are pushed forward, and 1.0 V when they are pulled back. If these voltages are not present, the problem is in either the Junction board, the cable from controller to PACM board, or the cable from PACM to Junction. 2) If voltages are OK, replace controller.
¤ ¤¤¤	SPD Limit Pot Fault	1) Check the cable from controller to PAC board and cable from PACM to Junction board. 2) Replace Controller. 3) Replace Junction board.
¤ ¤¤¤¤	Low Battery Voltage	1) Make sure the controller is getting correct battery voltage. 2) Replace Controller.

Flash Code	Description	Possible Cause
¤ ¤¤¤¤¤	Overvoltage	1) Make sure the controller is getting correct battery voltage. 2) Replace Controller.
¤¤ ¤	Main OFF Fault	1) Check motor wiring. 2) Make sure the controller is getting correct battery voltage. 3) Replace Controller.
¤¤ ¤¤¤	Main Cont FLTS	1) Check motor wiring. 2) Make sure the controller is getting correct battery voltage. 3) Replace Controller.
¤¤ ¤¤¤¤	Main ON Fault	1) Check motor wiring. 2) Make sure the controller is getting correct battery voltage. 3) Replace Controller.
¤¤¤ ¤	PROC/Wiring Fault	1) Replace Controller.
¤¤¤ ¤¤	Brake ON Fault	1) Replace Controller.
¤¤¤ ¤¤¤	Precharge Fault	1) Make sure the controller is getting correct battery voltage. 2) Replace Controller.
¤¤¤ ¤¤¤¤	Brake OFF Fault	1) Replace Controller.
¤¤¤ ¤¤¤¤¤	HPD	1) Replace Controller.
¤¤¤¤ ¤	Current Sense Fault	1) Check motor wiring. 2) Make sure the controller is getting correct battery voltage. 3) Replace Controller.
¤¤¤¤ ¤¤	HW Failsafe	1) Check motor wiring. 2) Replace controller.
¤¤¤¤ ¤¤¤	EEPROM Fault	1) Replace Controller.
¤¤¤¤ ¤¤¤¤	Power Section Fault	1) Check motor wiring. 2) Make sure the controller is getting correct battery voltage. 3) Replace Controller.

2.64 Visual Inspection—IntelliDrive® Transport System

Tools required: Flashlight Inspection mirror

1. Check the unit for external damage.
2. Using the mirror and flashlight, check for debris around the pulleys and levers.
3. Check the belt for damage and proper engagement on the pulleys.
4. Remove the drive unit cover.
5. Inspect the links and levers in the motor area for damage.
6. Remove the drive mechanism cover.
7. Check the tension on the drive belt.
8. Check overall condition of all components in the drive box.
9. Install the drive unit cover.

2.65 Junction Board Debugging—IntelliDrive® Transport System

NOTE:
When working on IntelliDrive® Transport System use extreme caution when servicing the product. Whenever you are measuring voltages or making adjustments to the Junction board, it is suggested that you take the bed out of steer which will raise the wheel and prevent the bed from moving.

Enable Switches

The enable switches are installed in the handles at the handle grip. If either switch is depressed, while force is applied to the handles, the bed will move. If the handles are pushed towards the patient, the bed will move forward. If the handles are pulled, the bed will move backwards. It is fairly simple to check the enable switches. First remove power supply cover so you can see the Junction board. Make sure both enable switches are plugged into the Junction board at P2 and P5. The switches are connected in parallel, or combined on the Junction board. The following voltages will be observed on a working system.

P6.1 4.0-5.1 V

P6.3 0-.5 V when switch is opened

P6.3 4.0-5.1 V when switch is depressed or closed

If you suspect a switch is not working correctly, the switches can be unplugged at P2 and P5. A meter can be used to measure switch continuity from the end of the switch cable. A working switch will close only when the switch is depressed. If it is always opened, or always closed, the switch or cable is defective. In either case replace the handle assembly. The bed will operate if only one switch functions. You can unplug the defective switch from the Junction board and verify the bed power unit operates when using the working switch.

If there is not a voltage at P6.1, verify the battery voltage or the battery charging voltage is present. The battery voltage can be measured at P4.8. This voltage will be greater than 32 V when the bed is plugged into the AC wall outlet. When the bed is unplugged from the AC outlet, the battery voltage at P4.8 will be greater than 22 V, if the batteries are charged. If no voltage is present, or the battery voltage is low, go to the Battery Checkout procedure.

If the switches check out correctly, and the voltage at P6.3 does not toggle when the switch is depressed, there may be a problem on the Junction board or the 14-pin connector at P6. Unplug the cable connected to P6, and inspect the

connector pins at P6 on the Junction board. Also, check connectors P2 and P5 where the enable switches plug into the Junction board.

The combined enable switch signal connects to the PACM board via the Junction-PACM board cable. To verify the signal is being received at the PACM board, unplug the 14-pin cable from the PACM board and measure continuity across pins 1 and 3. When either switch is depressed the switch closure can be measured across the pins.

Throttle Debugging

The base part of the handle that connects to the frame contains a strain element that provides an output signal proportional to the force applied to the handle. The handles are very similar to the load beams used in the scale system. The Junction board amplifies this signal and provides an output to the PACM board.

Verify the output signal is correct at P6.10. P6. 4 is used as a ground reference for measuring signals. When no force is applied to the handle the output signal should measure 2.4V to 2.6V DC. The voltage output can be adjusted by turning potentiometer R1 until the output signal measures 2.5V. When either handle is pushed, the output signal will increase until it reaches 4.0V to 4.5V. When either handle is pulled the output signal will decrease until it reaches 0.4V to 1.5V. This indicates the throttle circuit working correctly.

Before making any adjustments verify the supply voltages. The supply voltage at P6.8 will measure more than 22 V on a working system. If no voltage is present, or the battery voltage is low, go to the battery checkout procedure.

The excitation voltage, P3.5 and P7.5 (red wire) will measure 10V to 12V on a working board. Also, the signal voltages at P3.3, P7.3, P3.4, and P7.4 will be approximately ½ the voltage measured at P3.5 and P7.5. These are the green and white wires on the handle connectors P3 and P7. If the excitation voltage is lower than 10V, unplug the connectors P3 and P7 one at a time to see if the voltage comes into range. If this occurs, one of the handles is probably damaged and needs to be replaced. If the voltage never comes into range, verify the 12V supply at U2.2 to P6.4 on the Junction board. If a bad strain element is suspected, unplug the bad handle, readjust the zero output to 2.5V with potentiometer R1. Verify the bed power unit operates using the good handle. Replace the damaged handle.

If the output voltage at P1.1 cannot be adjusted to within 2.4V to 2.6V using the potentiometer R1, with no force applied to the handles, the strain element may be damaged. The bed will operate with a single handle after the output is adjusted. To check the handles, unplug one of the handles and see if R6 can be adjusted so the output signal is 2.5V. The handle that will not allow adjustment of the potentiometer to bring the output signal to 2.5V is the damaged handle.

The motor controller will not operate unless it sees the connection to the 4700 ohm resistor on the Junction board. To verify the signal is being received at the PACM board, unplug the 14-pin cable from the PACM board and measure the resistance across pins 12 and 13. The resistance needs to measure 4700 ohms +/- 5%. If this measurement fails check the cable for continuity and inspect the Junction board. The cable connections are the same on both ends. If the cable checks out, inspect the connector P6 on the Junction board. If the cable is bad, replace the cable, otherwise replace the Junction board.

Chapter 3
Theory of Operation

Introduction

There are three Theories of Operation for the VersaCare™ Bed:

- Mechanical
- Electrical
- Pneumatic

The interaction between these subsystems lets all the operational functions be used.

Each of the subsystems is described separately in the following sections. The schematic diagrams are located at the end of this chapter.

Mechanical System

The mechanical subsystem consists of the following connected systems:

- Base Frame Module
- Hilow Lift Module
- Upper Frame Module
- User Interface Module
- End Panel Module

Base Frame Module

The base frame module consists of the base frame, casters, brake and steer components, power supply and communication electronics, caregiver foot controls, and obstacle detect components. The module houses the components of the power supply and battery backup, communications, and night light. It also provides a mounting location for the power transport system including the drive components and push handles. And it also supports the head panel which

is not part of the weighed components on a scale bed. For this reason, contact between a patient, bedding, etc. and the headboard will affect scale readings.

Hilow Lift Module

The high low lift module consists of two lift arms, high low DC drives, and intermediate frame. The lift arms connect to the base by a sliding joint on each end of the bed and are secured to the base with a ground link. The high low lift module connects to the upper frame through load cell blocks for beds with scale, PPM and/or air, or through a non-scale spacer on beds without the those options. Components attached to the intermediate frame and below are not weighed by the scale system.

The high low lift module also controls the Trendelenburg and reverse Trendelenburg function by activating the high low drives in opposite directions to control the angle of the bed. Each high low DC drive includes a potentiometer to provide position feedback to the control system.

Upper Frame Module

The upper frame module consists of a segmented deck, on which the sleep surface rests, and a supporting tubular steel weigh frame. The deck is segmented into three sections: head, knee, and retracting foot. These sections may be moved by the caregiver or patient to change the bed positioning.

If the bed system is equipped with the optional scale, any item placed on the upper frame will be weighed. The load beams are mounted longitudinally on the weigh frame.

User Interface Module

The user interface module consists of left and right head siderails, left and right intermediate siderails, and the patient pendant. In the up position, the siderails are intended to make the patient aware of the proximity of the sleep surface edge. The siderails may be lowered below the patient surface to permit the patient to enter or exit the bed, and to give a caregiver unobstructed access to the patient. Caregiver controls, patient controls, and entertainment controls are mounted on the siderails. The head siderails are mounted to the articulating deck head section, and the intermediate siderails are mounted to the weigh frame. The pendant includes patient controls and can be inserted into either intermediate siderail. The pendant is connected to the weigh frame with a cable which can be attached to either side.

End Panel Module

The end panel module consists of a head panel and a foot panel. The head panel is a flat stationary panel vertically affixed to the base frame near the head end. The head panel is not weighed with the scale option. The headpanel's intended functions are:

- To provide grip areas for caregivers to use during transport.
- To provide an emergency CPR board

The head panel can be quickly removed by a caregiver for CPR or to gain access to the patient's head from the head end.

The foot panel is located at the foot end. It is affixed to the foot section of the articulating deck in such a way that it remains perpendicular to the surface of the foot section. The footpanel's intended functions are:

- To support the bottoms of the patient's feet in the chair and bed modes to prevent foot drop.
- To provide a support for patients to reposition themselves.
- To provide grip areas for caregivers to use during transport.
- To keep the patient from slipping off the foot end.
- To deter unauthorized patient exit from the foot end.

Electrical System

Logic and Motor Control

Power is supplied to the Logic Control by the P3200 linear power supply. The power supply provides an unregulated 19 - 35 V DC reference to signal GND at 2.5 A max, 1.75 A typical (see Power Supply Node HDD for input supply capabilities). The GROUND is common among all nodes in the bed.

The switch mode power supply consists of an input capacitor for input ripple current control, an integrated Switch Mode Control Integrated Circuit, the feedback choke, the output capacitor, and a high current, high speed Schottky diode. This buck regulator provides DC at 8.2 V and provides 3.5 A of current.

The under voltage detection circuit consists of a series resistor and zener diode connected to the input voltage source. The zener voltage, along with the base resistor, provides base current for the NPN bipolar transistor.

When the zener stops conduction due to an under voltage condition, the zener voltage is off, and turns off the transistor. The input voltage through the series resistance turns on the NPN transistor switch to the regulator. This will turn off the regulator.

A diode/bulk capacitor is added to the input of the +5 V regulator to keep the logic supply up longer than the +8.2 V supply. This time depends greatly on load current and functions active.

The Logic Controller consists of an embedded controller, a derivative of the 8051 family. The Input/Output structure is configured as an active low for both input and output. This allows pull ups to be used without the microprocessor running and not cause any operation to occur. The micro processor can be disconnected and not have any inputs or outputs enabled. The clock can also be disabled and not cause any operation to occur. All signals to and from the microprocessor are buffered. All signals that exhibit a slow rise are Schmidt triggered to prevent oscillation from occurring. Debounced inputs are provided for all switch inputs to the microprocessor.

The embedded processor is a Atmel 89C51CC01. This is an 8051 variant with internal 64K flash program and 256 + 1.2K EEPROM data memory. External to the microprocessor are the CAN transceiver, watch dog reset circuit, 2K EEPROM and the buffering circuitry for the H bridge motor controllers, and the sensors for motor position feedback.

The Controller Area Network (CAN) is a common Small Area Network solution that supports distributed product and distributed system architectures. The CAN bus is used to interconnect a network of electronic nodes or modules. Typically, a two wire, twisted pair cable is used for the network interconnection. The CAN protocol is a set of stringent rules, implemented in silicon, that supports the serial transfer of information between two or more nodes. CAN is implemented by a large number of industries including automotive, truck, bus, agriculture, marine, construction, medical, factory automation, textile, and many others. CAN is used as the basis for several major "7-layer" protocol developments such as J1939, CANopen, ISO11783, DeviceNet, and NMEA2000. Each of these large protocol architectures are essentially complete industry-specific network solutions packaged to include defined requirements for the physical layer, address structure, message structure, conversation structure, data structure, and application/ network interface. Pre-packaged "7-layer" protocols provide high value for vertically integrated industries like heavy truck, marine, or factory automation. On the other end of the spectrum, many other companies choose to develop a proprietary distributed product strategy. For both business and technical reasons, these companies internally create a customized "7-layer" CAN-based protocol that is optimized to satisfy their own application-specific requirements. The VersaCare™ Bed uses a proprietary CANopen solution, similar to what is used in the automobile industry.

Power Supply

Power Source

The bed is powered by 100, 110, 115, 120, 127, 220, 230, or 240 V AC, 50/60 Hz, single phase power and 24 V DC internal battery power. When AC power is available, the bed is powered by the transformer and the battery is being charged. When AC power is removed, the bed will shut down (no power). To use the battery backup, the user must press the battery enable switch. In battery backup mode, only the motors will function and all nodes will be powered up. After 10 minutes of no function switch activity, the bed will shut down (no power). This is the method used to save battery power.

The two primary fuses are 5.0 A, 250 V, TD, UL, 5X20 for 100, 110, 115, 120, and 127 V beds, and a 2.5 A, 250 V TD, IEC, 5 x 20 mm fuse for the 220, 230, and 240 V beds. The toroidal transformer is designed to provide 24 VDC at node VMOT_UR when the load at this node is 12 A DC. The transformer is designed to provide 36 VDC at node VLOG_UR when the load at this node is 3.5 A DC. At peak load the primary current is 5.7 Arms which corresponds to 684 VA. There are two secondary windings. Secondary 1 is rated at 21Vrms @ 20.4 Arms with regulation < 6%. Secondary 1 provides DC motor power, dc

air solenoid power, and AC air pump power. Secondary 1 fuse is a 20 A, 250 V, TD, UL. Secondary 1 has a 25% duty cycle. Secondary 2 provides battery charge power, logic power, IntelliDrive® Transport System charge power. Secondary 2 is rated at 28 Vrms @ 6.5 Arms with < 4% regulation. Secondary 2 has a 100% duty cycle.

For ESD immunity the system ground (Vss) is not connected to earth ground.

The batteries are 7.2Ahr connected in series for 24 VDC. The battery fuse is 15A, 250V, FB, UL, 3AB.

VMOT_UR

VMOT_UR (21.5 - 35 VDC, 24 VDC @ 12 A) is derived from secondary 1 full wave rectified by the external 35A bridge and filtered by the 68000uF external capacitor. Resistor, R3, discharges the filter capacitors when AC power is removed. Maximum discharge time is 4 minutes. Relay, K1, provides isolation between VBAT and VMOT_UR. The microprocessor will close the relay when on battery power.

VLOG_UR

BR1 and C38 provide the conditioning for VLOG_UR (30 - 46 VDC, 36 VDC @3.5 A).

Air Pump

The circuitry of RT5, Q6, U2, Q10, and P4 provide switched AC power for the air pump. The pump draws 3Arms maximum. The circuitry around U1 detects if power is available for the pump or not. The nominal voltage of the pump is 21 V AC.

Battery Charger

The circuitry around RT4, K3, Q2, Q3, R100, and D6 make up the high current parts of the battery charger. Relay, K3, is a supervisory switch for the charger. The charge voltage and current are regulated by Q2 via Q3. Resistor, R1, is used to sense the charge and discharge current. R12 and R15 provide a scaled voltage for the A to D to read.

MISC

Half of D6 is used for reverse battery protection along with the battery fuse.

IntelliDrive® Transport System Charge Power

Connector, P5, provides the 1.1 ADC path to the IntelliDrive® Transport System switching regulator board. P5-4 provides feedback to the microprocessor that the IntelliDrive® Transport System cable is connected.

Logic Power

P2-6 provides 1.5Adc, 20 to 45 VDC power the logic board depending on whether the system is power by AC or DC. Diode, D5, steers the power. Relay, K2, is used to connect or disconnect system logic power when AC power is off.

VCC

U13 regulates VCC to 5 VDC +/- .07. The +8 VDC distributed power is supplied from the logic board.

Microprocessor

U8 is an 8051 CAN version microprocessor. U7 serves as a watch dog, power up reset, and low Vcc reset. U9 serves as the CAN transceiver.

Foot Controls

Connectors, P23 and P24, via Port0 read the foot control (hall effect) switches. The resistors and capacitors provide ESD protection. The night lights are supplied by the regulated +8VDC and driven by half of U14. Each night light draws approximately 65 mA.

Obstacle Detection

Connectors, P27, P30, P31, and P32, provide power to the three obstacle detect infrared transmitters and detectors. When no obstacles are detected, the detection signal, P31-2, P30-3, and P32-3 is a zero to 5 V DC signal. The signal will be hi for 600 micro seconds and low for 2000 micro seconds. The 74Hc14 squares up the signal. The 100K ohm resistor and 0.1uF capacitor integrate the signal and generate a DC voltage of 3.7v +/- .25. This signal is read by the analog to digital converter. Any signal less than 3.2 VDC or above 4.2 VDC will be considered an obstacle detection.

AC Detection

The circuitry around Q8 detects the presence or absence of AC power and produces a static binary signal.

Miscellaneous Drivers

Q7 drives the charge supervisory relay, K3. Q11 drives the logic relay, K2. Half of U14 drives the motor power relay, K1. Q9 drives the battery status LED.

Analog Section

U12 is a battery gas gauge. It measures battery charge and discharge currents from the current sense resistor, R100, and converts it to coulombs. The microprocessor uses this data to update the battery status. U15 is a 10 bit digital to analog converter. The D to A ultimately controls the charge transistor, Q2. U11 is a 12 bit analog to digital converter. U19 is a temperature sensor. U10 is used to buffer the battery voltage divider. The OP amp circuit of U10 is a backup measurement device for battery charge current and is used to check the gas gauge current reading.

Nurse Call Relay Power

Diodes, D13, D17,and D26, provide power to the nurse call relay (located on the SideCom® Communication System P.C. board) while AC is on and while AC is off if the battery is capable.

LED Driver

U16 drives five red LEDs used to indicate power supply errors. It also drives three green LEDs used to indicate the battery charging state.

EEPROM

U20 is used to store voltage offset data for the back up charge current opamp, U10, and the battery capacity.

User Interface

Power is supplied to the User Interface system by the P3200 central power supply. The power supply provides a pre-regulated 8.2V DC +/- 5% referenced to signal GND. The GND is common among all nodes in the bed.

All of the caregiver control functions revolve around the microcontroller on the standard caregiver control board. This is an 8051 variant with internal 32K flash program, 256 + 1.2K EEPROM data memory, and 8 channels of A/D. External to the microcontroller are the CAN transceiver, watch dog reset circuit, serial I/O devices, and analog mux for interface to the microcontroller's A/D converter.

Digital switch inputs and LED outputs are read and set serially. The serial interface is SPI compatible and transfers data to and from the embedded controller.

Three LEDs are provided on the standard caregiver control board to indicate error conditions for troubleshooting.

Switch inputs that control bed motion are redundantly read with the microcontroller's A/D converter by analog multiplexers. For these switches, both analog and digital readings must be valid for a network message to be sent indicating a switch press.

Intelligence for actions pertaining to the caregiver control system resides in other bed modules. It reads the appropriate network variables for indicator updates and sends the status of switches to the appropriate module by network variable updates.

Patient Pendant

The patient pendant works on SPI communication. The pendant has a universal clock connected at pin 1 of the P1 connector. The clock provides a rising logic edge to move data into and out of the pendant.

PENDANT_CS is the pendant select line, which is connected at pin 2 of the P1 connector. The PENDANT_CS line will allow the user request to be read.

On pin 3 of the P1 connector is the Nurse Call connection, when the switch is pressed the bed places a call to the nurse.

GND is pin 4 of the P1 connector, which is logic, ground for the pendant.

Power is supplied to the pendant by the P3200 central logic board. The logic board provides a pre-regulated 8 VDC +/- 10% referenced to signal GND at 400mA max, 200mA typical. VCC is pin 6 of the P1 connector, which supplies the pendant with +8Vdc for circuit power. Using a low-dropout regulator the voltage is regulated to 5 VDC for logic power.

SPI_IN is the data line for writing to the pendant, which is on pin 7 of the P1 connector. Commands that will be written to the pendant are nurse call and nurse answer.

SPI_OUT located on pin 8 of the P1 connector is the serial data being read from the pendant. This line provides the patient commands to the bed, such as head up, head down, knee up, knee down, room or read lighting, TV, and radio. The output also has a tri-state buffer attached to the line, which allows the data to be routed to the logic board or to be held if the pendant is not selected by the pendant CS line.

SideCom® Communication System

Power is supplied to the SideCom® Communication System by the P3200 central power supply. The power supply provides a pre-regulated 8.2 ± 0.2 VDC referenced to signal GND at 400mA max, 200mA typical. The GND is common among all nodes in the bed.

All of the Scale and PPM functions revolve around the microprocessor on the control board. This is an 8051 variant with internal 32K flash program and 256 + 1.2K EEPROM data memory. External to the microprocessor are the CAN transceiver, UTV chip, watch dog reset circuit, SideCom® Communication System relays, and audio attenuator with 16 volume settings.

Scale and Patient Position Monitor

Power is supplied to the Scale/Patient Position Monitor (PPM) system by the P3200 central power supply. The power supply provides a pre-regulated 8-9 V DC referenced to signal GND at 400mA max, 200mA typical. The GND is common among all nodes in the bed. This is important to the network transceiver explained later.

The analog circuitry is a single chip solution specially designed for scale transducers. It is located in the frame of the bed as close to the load beams as possible. The load beams are resistive bridge sensors excited by a regulated DC voltage. This regulated voltage is supplied to the beams and to the A/D converter reference input to minimize the effects of variations.

Each beam is connected to the differential input on the A/D. The Mux and Gain (up to 128) is internally configurable through software. The A/D has the ability to detect open or shorted sensors. The part has a second stage sigma-delta converter. The serial interface is SPI compatible which transfers the data to the embedded controller.

The raw digital information is translated and further filtered in software before being placed on the network. If needed, the accelerometer or motor position can be used to detect the level of the bed with respect to the floor and then correct for the cosine error.

The display consists of 5 seven-segment digits. The scale node sends a network variable for the caregiver to display. Switches, located on the display board are available to the user to initiate functions like Zero and display weight. When activated the network variable gets updated and read by the scale node.

A model beds: Three FSRs are located on the sleep surface in strategic positions. They are buffered by an LM324 configured as a DIFF amp. The head sensor is the only one used for the sensitivity mode. The other two are located in the seat section. All Three FSRs are used to detect an out of position. Load beams are used to detect that a patient has left the bed. The FSRs and load beams information is sent to the air node. The FSR is in A/D counts while the load beams information is formatted into pounds using the factory zero as the offset. The factory zero is calculated during calibration only.

B model and newer beds: Three FSRs can be located on the sleep surface in strategic positions. They are buffered by an LM324 configured as a DIFF amp. The head sensor is the only one used for the sensitivity mode. The other two are located in the seat section. The load beams are used to detect patient activity. The FSRs and load beams information is sent to the air node. The FSR is in A/D counts while the load beams information is formatted into pounds using the factory zero as the offset. The factory zero is calculated during calibration only.

The FSR output will decrease in resistance with increased force. Each FSR is connected between a 3.3K and a 2.2K resistor to limit the current. The 3.3K are connected to regulated +5 V and the 2.2K are connected to signal GND, forming a simple voltage divider. A differential amplifier then takes the voltage across the FSR. This is fed into a single ended 4 channel 8-bit A/D device internal to the embedded controller.

Switches located on the outside of the head rail are available to the caregiver to initiate functions such as mode selection, off, and alarm volume level. The LEDs indicate status of the PPM system.

All of the Scale and PPM functions revolve around the microprocessor on the control board. This is an 8052 variant with internal 32K flash program and 256 + 1.2K EEPROM data memory. External to the microprocessor are the CAN transceiver, accelerometer, watch dog reset circuit, 2K EEPROM and audio enunciator with three volume settings.

If the AC power is removed from the bed and the PPM system is armed a priority and Nurse call are placed as well as a local alarm. If for any reason the scale node goes away or cannot communicate the SideCom® Communication System board monitors the scale nodes heartbeat and places the alarm if PPM was armed. Under battery power neither the scale nor PPM systems work.

IntelliDrive® Transport System

Push Handles

The push handles incorporate strain gauge elements to sense the force applied by a caregiver in either a forward or reverse direction. The strain gauges are connected to the junction board. Each push handle also incorporates an enable switch. The enable switches are connected to the junction board.

Junction Board

The junction board produces a regulated 12 VDC signal from the battery voltage to excite the strain gauges in the push handles to produce a signal in response to applied pressure. The strain gauge signals are then combined such that the forces applied to each handle are added together. A net push causes a positive signal, a net pull causes a negative signal. The junction board also contains amplifier circuitry to convert these signals from the strain gauges into a throttle signal for the drive motor controller. A positive signal results in a forward throttle signal to the motor controller. A negative signal yields a reverse throttle signal to the motor controller. The full scale forward throttle signal is about 4.0 volts and the full scale reverse throttle signal is about 1.0 volt. A signal of 2.4 -2.6 V is neutral. These levels make sure that the throttle signal to the motor controller is never out of range for a correctly connected system.

The junction board has connectors for the enable switches in the handles, paralleling the enable switches to produce one enable signal to the IntelliDrive® Transport System box. There is also a connector on the junction board for a steer switch.

Finally, the junction board contains a connector to receive bed power, both to charge the battery and to raise the drive wheel if deployed, regardless of the condition of the battery.

Power Assist Control Module

The Power Assist Control Module (PACM) consists of a printed circuit board mounted to a heat-sink plate. The plate provides essential heat sinking for

power components of the circuit board and secondarily provides for mounting the assembly inside the box. The PACM supplies the following functions:

- Battery charger
- Battery gas gauge
- Deployment control
- Enable switch logic & relay
- Drive motor over-temperature protection
- Battery shut-off

Battery Charger

The battery charger operates from a nominal 40 VDC produced by the P3200 bed whenever the bed is plugged in. First, a voltage regulator provides a regulated 34 VDC supply. The 34 VDC supply powers the charger. This charger has three modes of operation: trickle charge, bulk charge, and float charge.

The trickle charge mode produces a current of 20 to 30 milliamps to bring the battery voltage up to 22.5 volts. In the event a battery has a defective cell, this low level current will not produce a hazardous situation. If the battery is capable of taking a charge, its voltage will eventually come up to 22.5V. (If the battery has been deeply discharged, this may take several days.) Once the voltage is above the trickle threshold, the charger circuit changes to mode 2. In this mode, bulk charging occurs during which current is limited to a constant level. The charger stays in this mode until the battery voltage is approximately 29 - 30 volts. At this point the current slowly drops off as the battery nears full charge. When the current drops to 10% of the constant current level, the charger enters mode 3, the float charge mode. In this mode the charger output drops to 27.8 volts to keep the battery topped off. A STATUS output of the charger goes high indicating that charging is complete.

The 34 VDC powers the PACM's logic which, upon sensing correct battery polarity, energizes the battery relay, thereby connecting the battery to the charger and to the IntelliDrive® System circuitry.

Battery Gas Gauge

The battery gas gauge monitors the voltage across a low value resistor in series with the battery as a function of time, interpreting positive voltages as current into the battery (charging) and negative voltages as current out of the battery (discharging). The gas gauge indicates battery capacity on five output signals, each representing approximately 20% of the nominal battery capacity.

Deployment Control

There are three inputs to the deployment control circuitry: DC power from the bed, the steer switch, and the enable switch. Also, the deployment motor must provide limit switch output to reflect the extended (deployed or down) and retracted (stowed or up) positions of the deployment motor.

If bed power is absent, the steer switch has been closed, neither handle enable switch is closed and the drive mechanism is not down, the logic turns on the deployment motor to lower the mechanism. The logic subsequently turns the motor off when the extended limit switch opens or a twelve second timer times out, or if bed power is applied or the steer switch opens.

Similarly, if the bed power is applied or the steer switch is open and the drive mechanism is not up, the logic turns on the motor to raise the mechanism. The logic subsequently turns the motor off when the retracted limit switch opens or the timer times out, or if bed power is removed or the steer switch closes.

Whenever the mechanism is not down or bed power is present or the steer switch is open, the logic asserts an /INHIBIT signal to the motor controller to prevent it from driving the drive motor. Conversely, if the mechanism is down, bed power is absent and the steer switch is closed, the /INHIBIT signal is removed allowing the motor controller to drive the drive motor.

Enable Switch Logic and Relay

The enable switch, when closed while the drive mechanism is fully down, provides an input to the logic which removes the /INHIBIT input to the motor controller. At the same time, a relay is energized which connects the drive motor to the motor controller output allowing the controller to drive the drive motor. When the enable switch is subsequently opened, the logic again asserts the /INHIBIT signal to the motor controller, causing it to decelerate the drive motor to a stop. The relay opens after a six second delay, allowing the motor controller time to stop the motor before disconnecting the motor from the controller. As a back-up, the normally closed relay contact shorts the motor producing a further braking effect. This effect will slow or stop the drive motor even if the battery becomes disconnected.

Drive Motor Over-temperature Protection

The PACM includes a connection for a normally closed thermal switch. The opening of such a switch produces an input to the logic that causes the /INHIBIT signal to the motor controller to be asserted. The motor controller will bring the drive motor to a stop in this case. In situations where the drive motor is operated under high load (such as powering the bed up a ramp) for

more than a minute or so, self-resetting fuses (PTCs) interrupt the power connection to the motor controller. As with the switch opening, the motor controller will bring the drive motor to a stop. To manually push the bed in either of these circumstances, the drive wheel can be stowed or the manual override switch can disconnect the motor from the short to release the brake. Upon sufficient cool off time for either the thermal switch to close or the PTCs to reset, if the override switch is closed, power assist can be resumed.

Battery Shut-off

The gas gauge chip monitors the battery voltage. When the chip detects the battery at its end of discharge voltage, the logic de-energizes the battery connect relay. This disconnects the battery to prevent it from further discharging.

Also, the PACM includes an input for a manual shut-down switch. If this switch is closed for approximately 6 seconds, the shut-down logic is armed. Opening the switch causes the logic to de-energize the battery connect relay. This disconnects the battery from the electronics. In the event of a stuck shut-down switch, that is, one failed closed, the logic will be armed but never triggered, preventing nuisance shut-downs.

Deployment Motor

The deployment motor is a 24 VDC linear actuator with internal normally closed limit switches to indicate full travel in the extended and the retracted position. The motor circuit is separate from the limit switch circuit so that the driver circuit can shunt the motor to provide higher holding force. The logic can monitor the limit switches to correctly control the driver circuit.

Drive Motor

The drive motor is a 24 VDC, insulation class H, permanent magnet gear motor producing approximately 180 in-lb. of torque at 35A. The drive motor incorporates a Klixon®[1] YS11 style thermal switch attached to the inside of the motor housing and characterized to open if the temperature of the motor housing reaches 2012 °F (1100C). This temperature was chosen to track the motor winding at a safe operating temperature.

Battery Capacity Indicator

The battery capacity indicator contains one amber LED to indicate bed power applied or an energized battery relay and five green LEDs to indicate the

1. Klixon® is a registered trademark of Texas Instruments, Inc.

remaining charge in the battery, each successive LED representing approximately 20 percent of the battery capacity.

The battery capacity indicator also includes a shutdown switch to signal the PACM logic to disconnect the battery.

Pneumatic

The air system contains the following components: air mattress, pneumatic system, control board, scale system, left and right force sensing resistors, and the air board software, which manages the entire operation of the above items.

The air mattress contains five air bladders: head, seat, heel, left turn assist and right turn assist. The head, seat, and heel bladders are used to support the patient. The left and right turn assist bladders are used to aid the caregiver in rotating a patient in order to change linens or reposition the patient.

The pneumatic system consists of the pneumatic valves, air compressor, and mattress connector. The control board and software currently support two different valve types. The SMC pneumatic valves are a pilot pressure operated valve. They pull very little current due to their pilot operation; however, the pilot pressure must be maintained in order for the valves to work correctly. The second type is the MAC valve which has a standard solenoid construction. The MAC valves draw much more current than the SMCs and therefore; the MAC valves are pulse width modulated after the valve has been actuated to reduce the amount of current draw. The power supply board controls the air compressor. The air system commands the power supply to turn on the compressor by the CAN network. The mattress connector has a hall effect sensor so as to detect the presence of the air mattress.

The air control board has the hardware to activate the valves, read pressures from the air bladders, read the patient head section force sensing resistors, detect the presence of the air mattress, give an audible alarm to the caregiver, store operating variables in non-volatile memory, measure valve currents and supply voltages, and measure head angle.

The scale system supplies load beam and PPM sensor data by the CAN network. This data, along with the measurements of the head section FSRs, are used to determine patient weight, detect the presence of a patient, and detect if a patient is sitting up.

Schematics

Schematic—Electronics

Figure 3-1. Electronics

Refer to fold-out FO 3-1 at the rear of this manual.

Schematic—Motor Control P.C. Board (PN 68717)

Figure 3-2. Motor Control P.C. Board (PN 68717)

Refer to fold-out FO 3-2 at the rear of this manual.

Schematic—Logic Control P.C. Board (PN 69378)

Figure 3-3. Logic Control P.C. Board (PN 69378)

Refer to fold-out FO 3-3 at the rear of this manual.

Schematic—Siderail Controls

Figure 3-4. Siderail Controls

Refer to fold-out FO 3-4 at the rear of this manual.

Schematic—Optional Controls

Figure 3-5. Optional Controls

Refer to fold-out FO 3-5 at the rear of this manual.

Schematic—Patient Controls

Figure 3-6. Patient Controls

Refer to fold-out FO 3-6 at the rear of this manual.

Schematic—Patient Pendant

Figure 3-7. Patient Pendant

Refer to fold-out FO 3-7 at the rear of this manual.

Schematic—Power Supply (PN 72289)

Figure 3-8. Power Supply (PN 72289)

Refer to fold-out FO 3-8 at the rear of this manual.

Schematic—Motor Control P.C. Board (PN 72273)

Figure 3-9. Motor Control P.C. Board (PN 72273)

Refer to fold-out FO 3-9 at the rear of this manual.

Schematic—Power Supply P.C. Board (PN 70786)

Figure 3-10. Power Supply P.C. Board (PN 70786)

Refer to fold-out FO 3-10 at the rear of this manual.

Schematic—Transformer Adapter Cables

Figure 3-11. Transformer Adapter Cables

Refer to fold-out FO 3-11 at the rear of this manual.

Chapter 4
Removal, Replacement, and Adjustment Procedures

Tool and Supply Requirements

To service the VersaCare™ Bed, the following tools and supplies are required:

- Ratchet
- Extension, 6"
- 7 mm wrench
- 13 mm wrench
- 13 mm socket
- 17 mm wrench
- T25 Torx®[1] screwdriver
- T20 Torx® screwdriver
- T15 Torx® screwdriver
- T10 Torx® screwdriver
- Small screwdriver
- #2 phillips head screwdriver
- Rubber mallet
- E-ring installation tool
- (2) Jack stands
- Scissor jack
- 3/32" punch
- Rivet gun with plastic rivets
- Pot of white petroleum jelly (approx. 400 g)
- 130016 Safety jack (2 each)

1. Torx® is a registered trademark of Textron, Inc.

- 7/64" drill bit
- Drill
- #6-32 tap
- 3/8" nut driver
- Wire cutters
- 2" x 4" x 36" piece of wood
- String, 10' (305 cm)
- 1/4" nut driver
- 1/4" bow end wrench
- Needle nose pliers
- Antistatic strap
- 7/16" deep well socket
- 7/16" open end wrench
- Voltmeter
- Window cleaner
- Rags
- Screwdriver

4.1 Mattress

Tools required: Screwdriver

Removal

1. Set the brakes.
2. Raise the bed to the high position.
3. Press the Enable control on the siderail controls.
4. Simultaneously press both the Max-Inflate and Pressure Relief controls until both indicators go off.

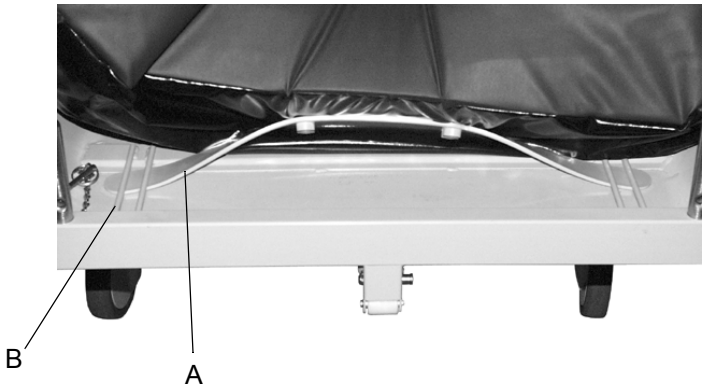
WARNING:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

5. Unplug the bed from its power source.
6. Lift the foot end of the mattress.

WARNING:
Use extreme care when removing the mattress retaining strap. Failure to do so can cause injury as the strap snaps out of the retainers.

7. Carefully remove one side of the mattress retaining strap (A) from the retainer (B) (see figure 4-1 on page 4-3).

Figure 4-1. Retaining Strap



m333_088

NOTE:
The foot end and head end retaining straps are removed the same way.

8. Remove the other side of the mattress retaining strap from the retainer.

9. Remove the headboard.

10. Carefully remove one side of the mattress retaining strap from the retainer.

11. Remove the other side of the mattress retaining strap from the retainer.

12. For short stay sleep surfaces, remove the mattress.

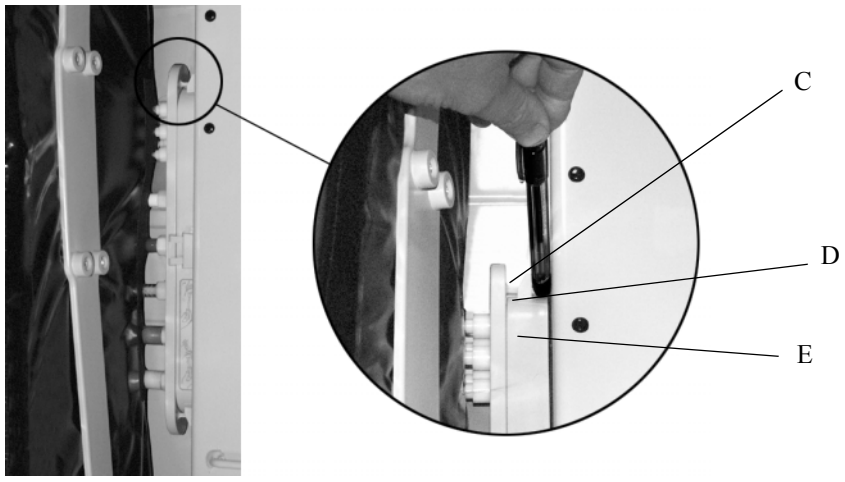
13. For treatment surfaces, do the following:

    a. Insert a small screwdriver between the surface hose connector (C) and the bed hose connector latch tabs (D) on each end of the connector (E) (see figure 4-2 on page 4-4).

NOTE:
The end of the surface hose connector will pop out of the bed hose connector.

    b. Remove the treatment surface from the bed.

Figure 4-2. Treatment Surface



Replacement

1. Do the removal procedure in reverse order.

2. To make sure the VersaCare™ Bed operates correctly, do the "Function Checks" on page 2-6.

4.2 Caster

Tools required: T25 Torx®[1] screwdriver
Scissor jack
17 mm wrench

Removal

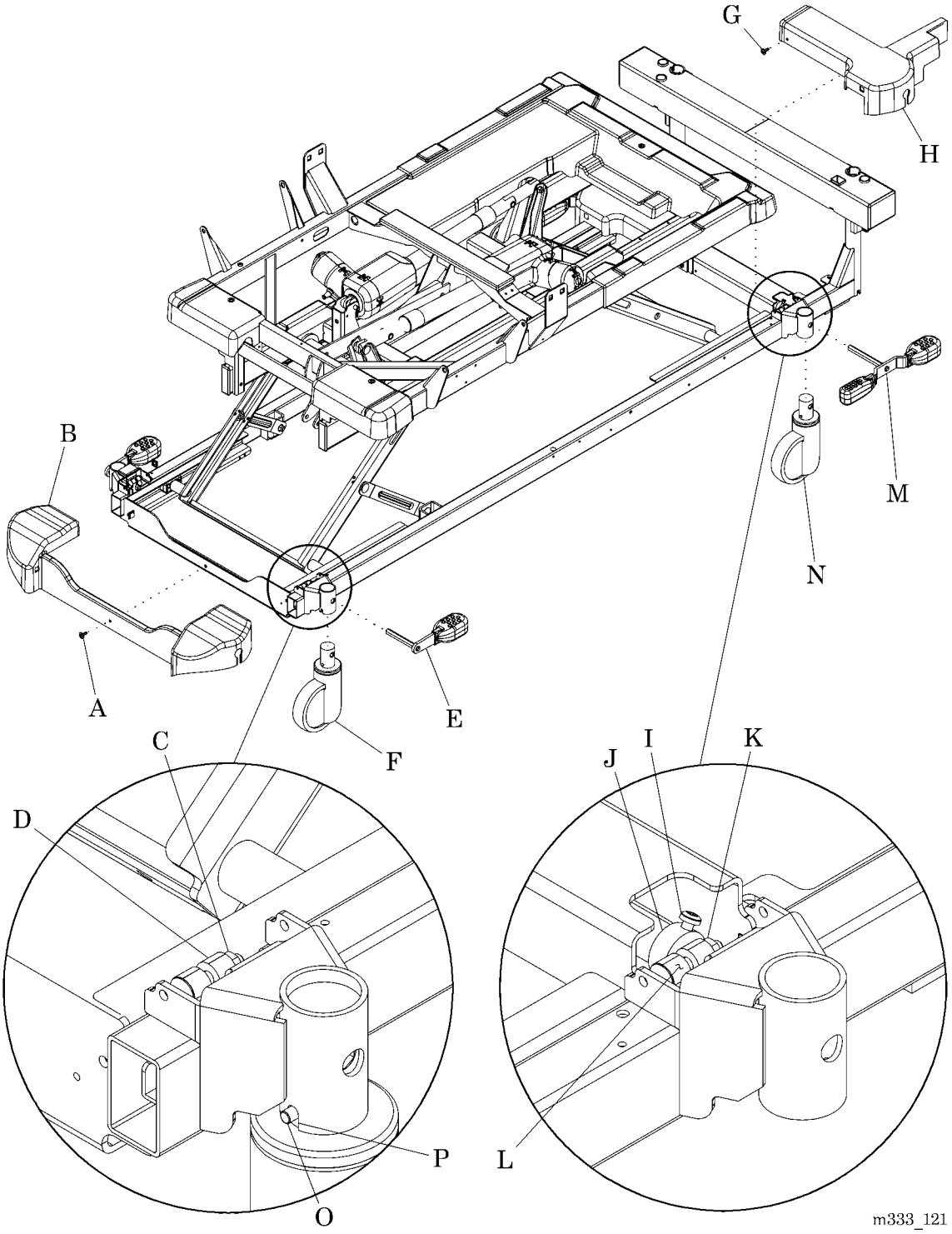
1. Set the brakes.
2. Raise the bed to the high position.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

3. Unplug the bed from its power source.
4. For foot end casters, do the following:
   c. Remove the screw (A) securing the foot end cover (B) to the bed (see figure 4-3 on page 4-6).
   d. Remove the foot end cover (B).
   e. Using the scissor jack, raise the corner of the bed that the caster is being removed from.
   f. Loosen the nut (C) on the clamp (D).
   g. Remove the brake/steer pedal (E) from the bed.
   h. Remove the caster (F) from the bed.
5. For head end casters, do the following:
   a. Remove the screw (G) securing the head end cover (H) to the bed.
   b. Remove the head end cover (H).
   c. Using the scissor jack, raise the corner of the bed that the caster is being removed from.
   d. Loosen, but do not remove, the setscrew (I) on the torque tube (J).
   e. Loosen the nut (K) on the clamp (L).
   f. Remove the brake/steer pedal (M) from the bed.
   g. Remove the caster (N) from the bed.

1. Torx® is a registered trademark of Textron, Inc.

Figure 4-3. Caster



Replacement

NOTE:
The new caster comes in the **neutral** position.

1. For foot end casters, do the following:
   a. Using the brake/steer pedal (E), set the caster to the brake position.
   b. Position the new caster so the alignment pin (O) will fit into the slot (P).
   c. Insert the caster (F) into the bed.
   d. Install the brake/steer pedal (E) through the caster (F) and clamp (D).
   e. Tighten the nut (C).
   f. Install the foot end cover (B).
   g. Install the screw (A) to secure the foot end cover (B) to the bed.
   h. To make sure the VersaCare™ Bed operates correctly, do the "Function Checks" on page 2-6.

2. For head end casters, do the following:
   a. Using the brake/steer pedal (E), set the caster to the brake position.
   b. Position the new caster so the alignment pin (O) will fit into the slot (P).
   c. Insert the caster (N) into the bed.
   d. Install the brake/steer pedal (M) through the caster (N) and clamp (L) into the torque tube (J).
   e. Tighten the setscrew (I).
   f. Tighten the nut (K).
   g. Install the head end cover (H).
   h. Install the screw (G).
   i. To make sure the VersaCare™ Bed operates correctly, do the "Function Checks" on page 2-6.

4.3 CPR Cable

Tools required: T25 Torx®[1] screwdriver
7 mm wrench

Removal

1. Set the brakes.
2. Raise the bed to the high position.
3. Raise the head section to the highest position.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

4. Unplug the bed from its power source.
5. Loosen the jam nut (A) (see figure 4-4 on page 4-9).
6. Remove the CPR cable hook (B) from the handle bracket (C).
7. Remove the nut (D).
8. Remove the CPR cable (E) from the mount bracket (F).
9. Remove the two screws (G) from the CPR release cover (H).
10. Slide the CPR release cover (H) down.
11. Remove the CPR cable (E) from the CPR release (I).
12. Cut and remove the two cable ties (J) securing the CPR cable (E) to the head section (K).
13. Remove the CPR cable from the head section.

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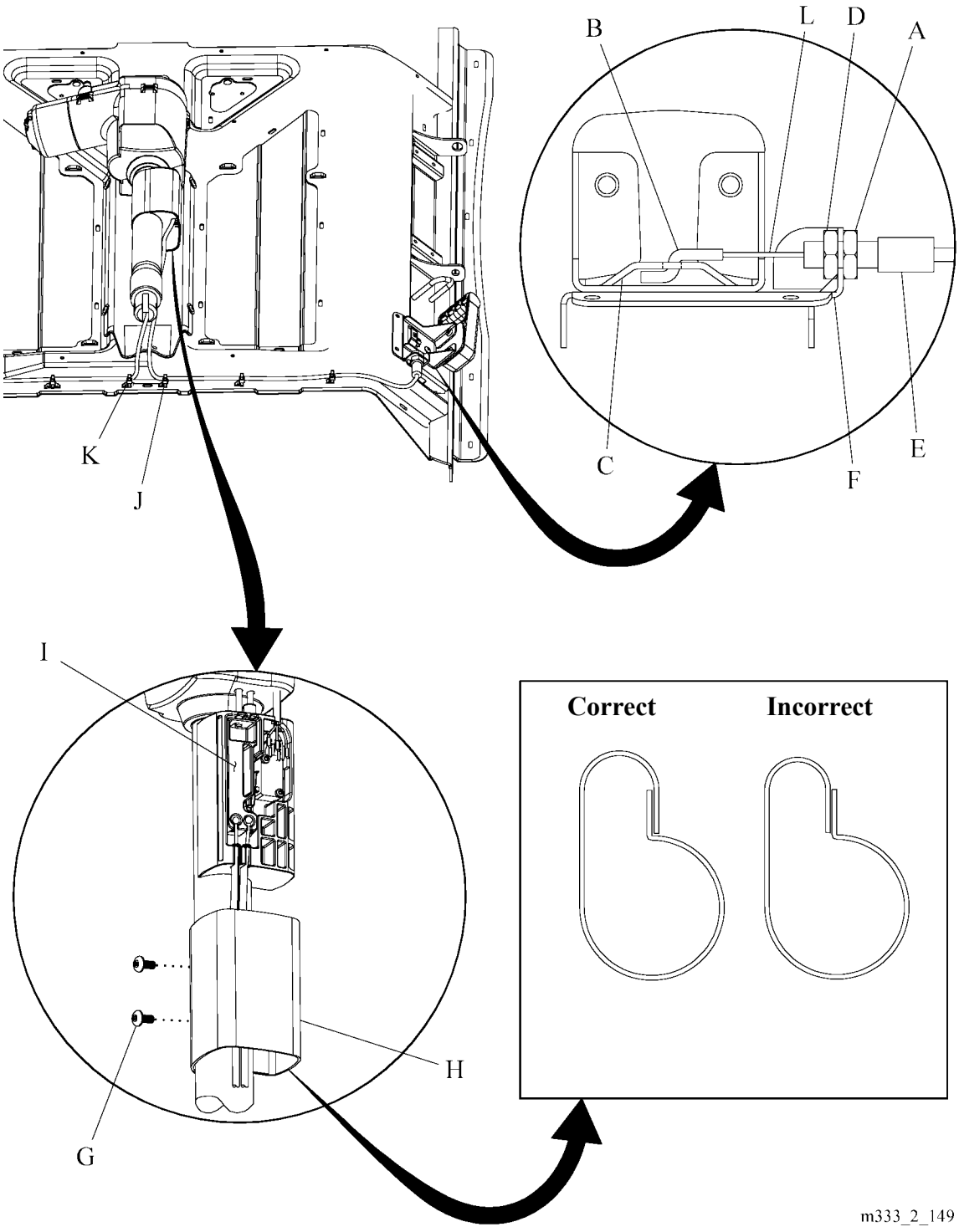
Figure 4-4. CPR Cable



Replacement

1. Install the jam nut (A) onto the CPR cable (E).
2. Install the CPR cable (E) into the mount bracket (F).
3. Install, but **do not tighten**, the nut (D) onto the CPR cable (E).
4. Install the CPR cable hook (B) into the handle bracket (C).
5. Route the CPR cable (E) through the CPR release cover (H) to the CPR release (I).
6. Install the CPR cable (E) into the CPR release (I).
7. Using cable ties (J) secure the CPR cable (E) to the head section (K).
8. Install the CPR release cover (H) onto the CPR release (I).
9. Install the two screws (G) to secure the CPR release cover (H) to the CPR release (I).
10. Adjust the CPR cable (E), refer to “Adjustment” on page 4-10.

NOTE:
The two nuts (A) and (D) will be tightened during the adjustment procedure.

Adjustment

1. Pull the CPR cable (E) until the wire (L) is snug and the CPR handle just starts to move.
2. Run the nut (A) against the mount bracket (F).
3. Tighten the nut (D).
4. Make sure the wire (L) is snug, adjust the CPR cable (E) as needed.
5. Pull the CPR handle. The Emergency CPR should activate when the CPR handle travels approximately half way.
6. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.4 Head Siderail

Tools required: T25 Torx®[1] screwdriver
E-ring installation tool
Screwdriver

Removal

1. Set the brakes.
2. Raise the bed to the high position.
3. Raise the head section to the highest position.
4. Raise the siderail being changed to the up and locked position.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

5. Unplug the bed from its power source.
6. Remove the screws (A) securing the cover (B) to the bed (C) (see figure 4-5 on page 4-12).
7. Remove the cover (B).
8. Remove the two screws (D) securing the electronics module cover (E) to the electronics module (F).
9. Remove the electronics module cover (E).
10. Remove the two screws (G) securing the cable cover (H) to the head section (I) (see figure 4-6 on page 4-13).

NOTE:
The screws being removed should be on the same side as the siderail being replaced.

11. Cut and remove the cable ties (J) securing the siderail cable to the head section (I).

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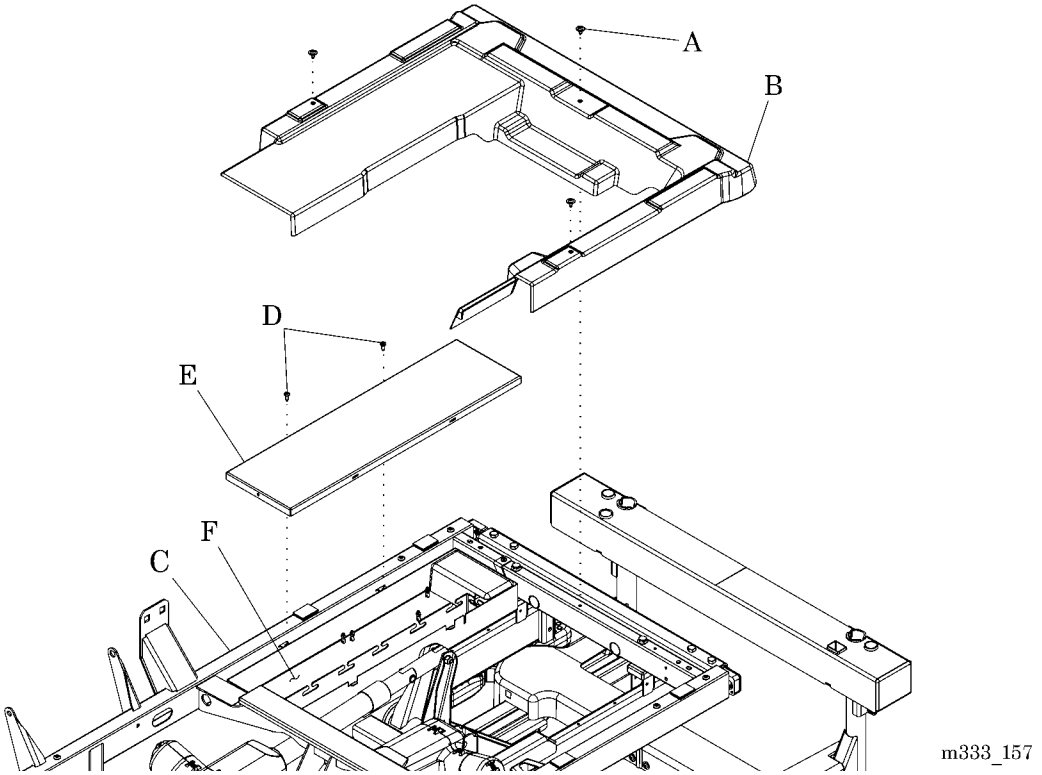
Figure 4-5. Cover Removal



12. Disconnect the siderail cable from the logic control P.C. board inside the electronics control module.

13. Remove the siderail cable from the behind the cable cover (H).

14. Remove the E-ring (K) and washer (L) from the siderail dampener (M) (see figure 4-7 on page 4-14).

15. Disconnect the dampener (M) from the bracket post (N).

16. Remove the E-ring (O) from the lower D-pin (P).

17. Remove the E-ring (Q) from the upper D-pin (R).

18. Remove the lower D-pin (P).

19. While supporting the siderail, remove the upper D-pin (R).

Figure 4-6. Cable Routing

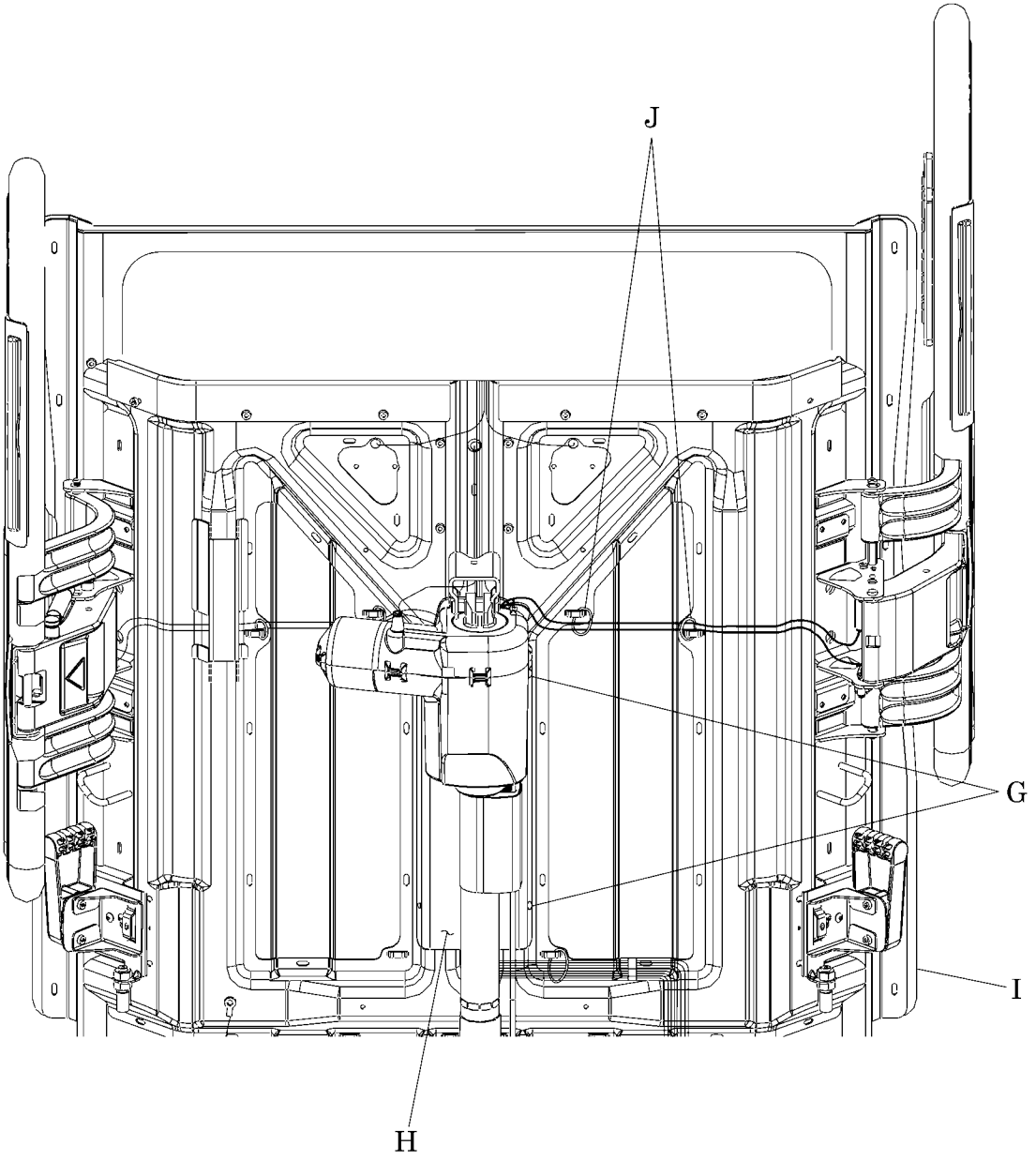
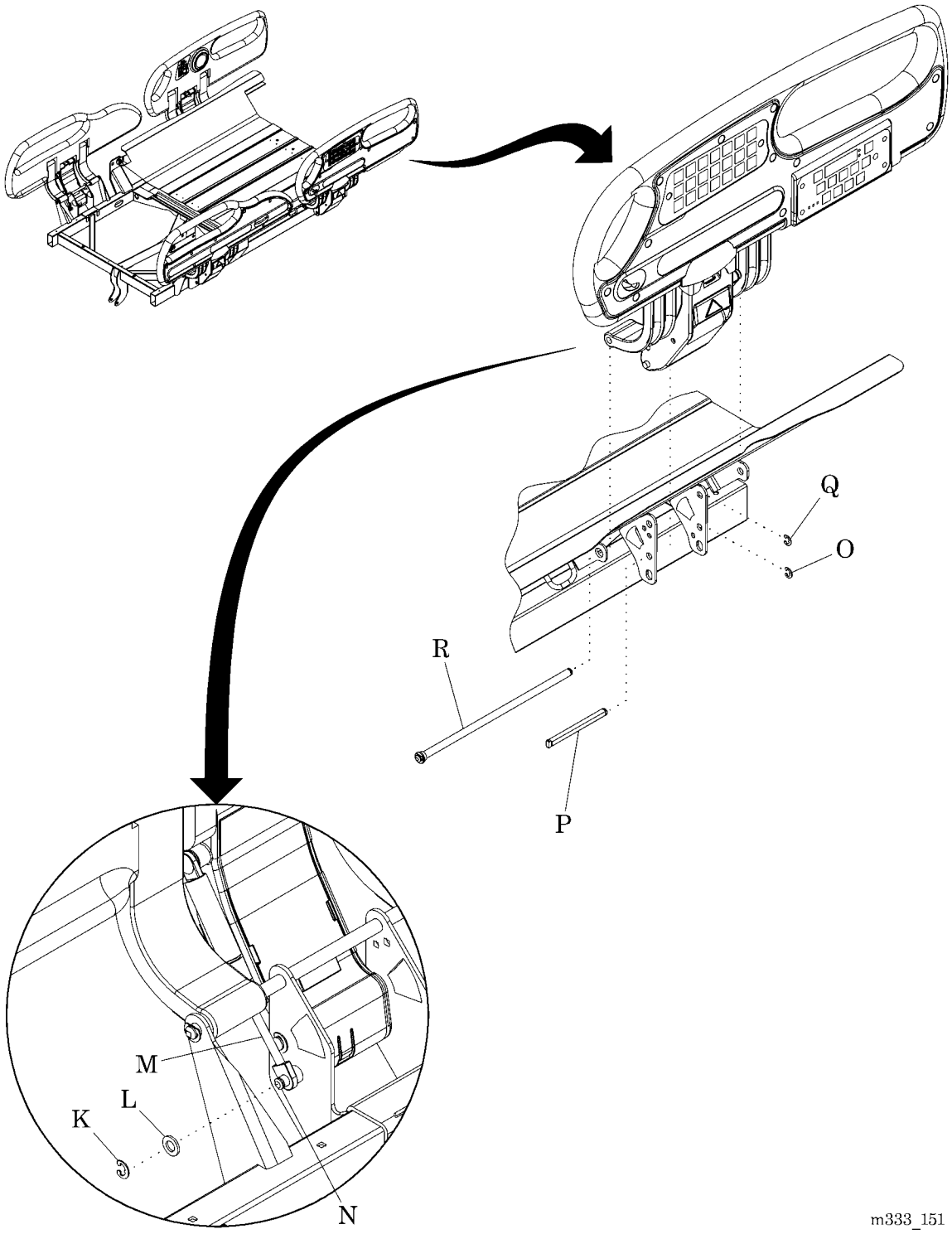


Figure 4-7. Head Siderail



Replacement

1. Do the removal procedure in reverse order.
2. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.5 Intermediate Siderail

Tools required: Screwdriver
E-ring installation tool
Rubber mallet

Removal

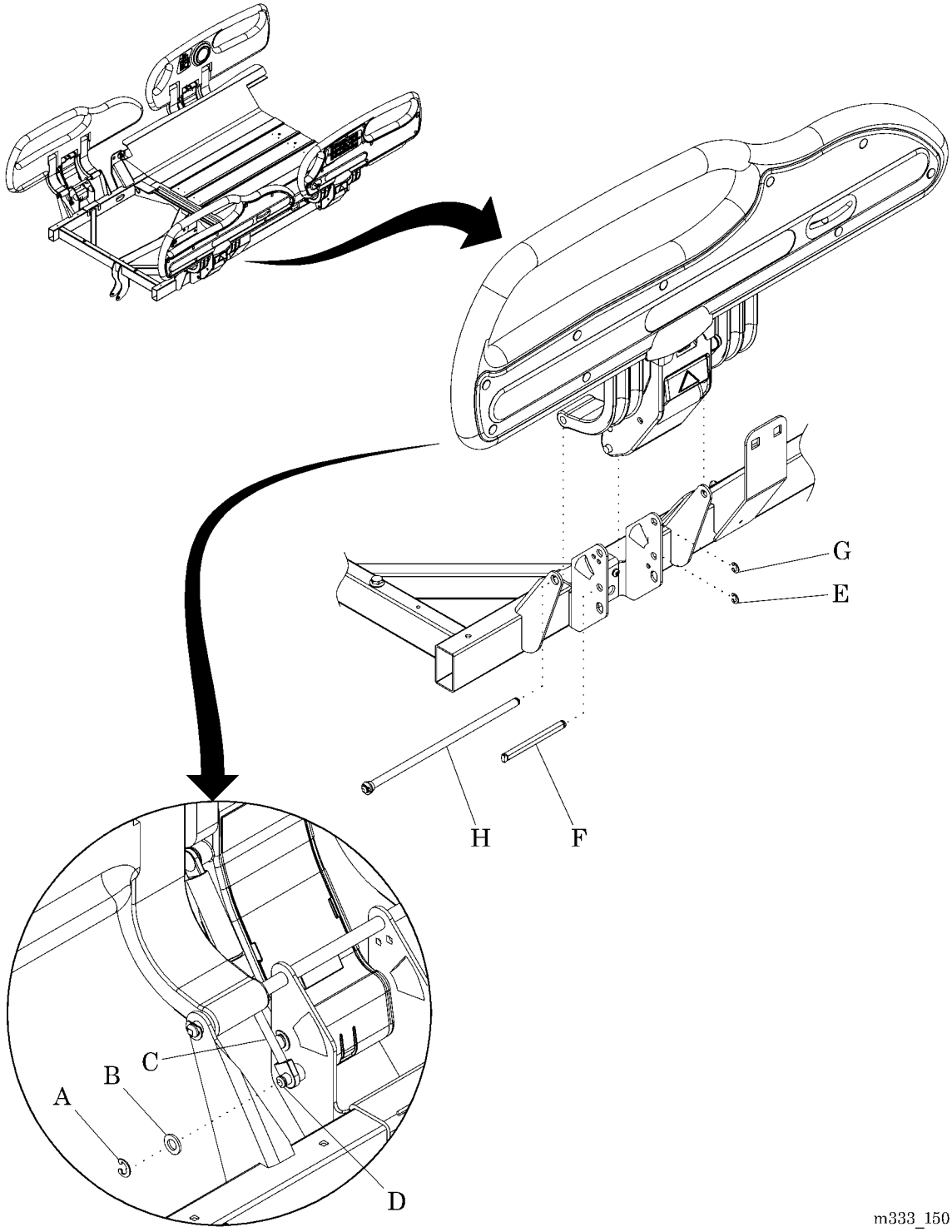
1. Set the brakes.
2. Raise the bed to the high position.
3. Raise the knee section to the highest position.
4. Raise the siderail being changed to the up and locked position.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

5. Unplug the bed from its power source.
6. Remove the E-ring (A) and washer (B) from the siderail dampener (C) (see figure 4-8 on page 4-17).
7. Disconnect the dampener (C) from the mounting post (D).
8. Remove the head end E-ring (E) from the lower D-pin (F).
9. Remove the head end E-ring (G) from the upper D-pin (H).
10. Unlatch the siderail.
11. Remove the lower D-pin (F).
12. While supporting the siderail, remove the upper D-pin (H).

NOTE:
The right side D-pin bushing will come off the D-pin.

Figure 4-8. Intermediate Siderail



Replacement

1. Do the removal procedure in reverse order.
2. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.6 Head Siderail P.C. Board

Tools required: T20 Torx®[1] screwdriver
T15 Torx® screwdriver
7/64" drill bit
Drill
#6-32 tap

Removal

1. Set the brakes.
2. Raise the bed to the high position.
3. Raise the appropriate siderail to the up and locked position.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

4. Unplug the bed from its power source.
5. Drill a hole in the center of each screw cover (A) (see figure 4-9 on page 4-20).
6. Using the tap, remove the screw covers (A).
7. Remove the 12 screws (B).
8. Remove the siderail cover (C) from the siderail (D).
9. Disconnect any cable from the P.C. board (E).
10. Remove the four screws (F) securing the P.C. board (E) to the siderail.
11. Remove the P.C. board (E) from the siderail (D).

Replacement

1. Make sure the gasket (G) is installed in the siderail.
2. Do the removal procedure in reverse order.
3. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

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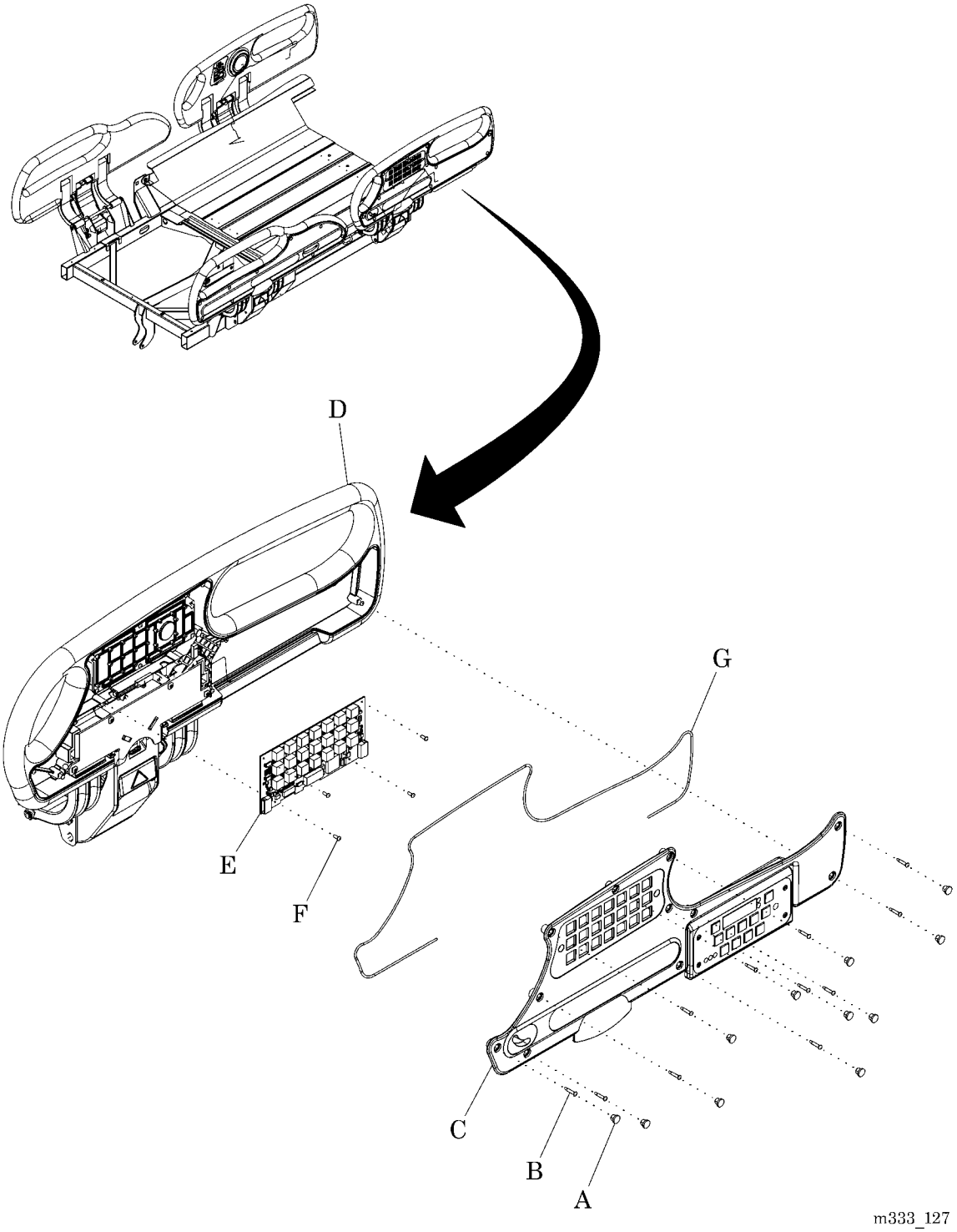
Figure 4-9. Head Siderail P.C. Board



4.7 Speaker

Tools required: T20 Torx®[1] screwdriver
T15 Torx® screwdriver
7/64" drill bit
Drill
#6-32 tap
3/8" nut driver

Removal

1. Set the brakes.
2. Raise the bed to the high position.
3. Raise the appropriate siderail to the up and locked position.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

4. Unplug the bed from its power source.
5. Drill a hole in the center of each screw cover (A) (see figure 4-10 on page 4-22).
6. Using the tap, remove the screw covers (A).
7. Remove the 12 screws (B).
8. Remove the siderail cover (C) from the siderail (D).
9. Put the siderail cover (C) on the bed.
10. Remove the four screws (E) from the P.C. board (F).
11. Fold down the P.C. board (F).
12. Remove the six screws (G) securing the stiffener (H) to the siderail (D).
13. Remove the stiffener (H).
14. Remove the four nuts (I) securing the speaker (J) to the siderail (D).

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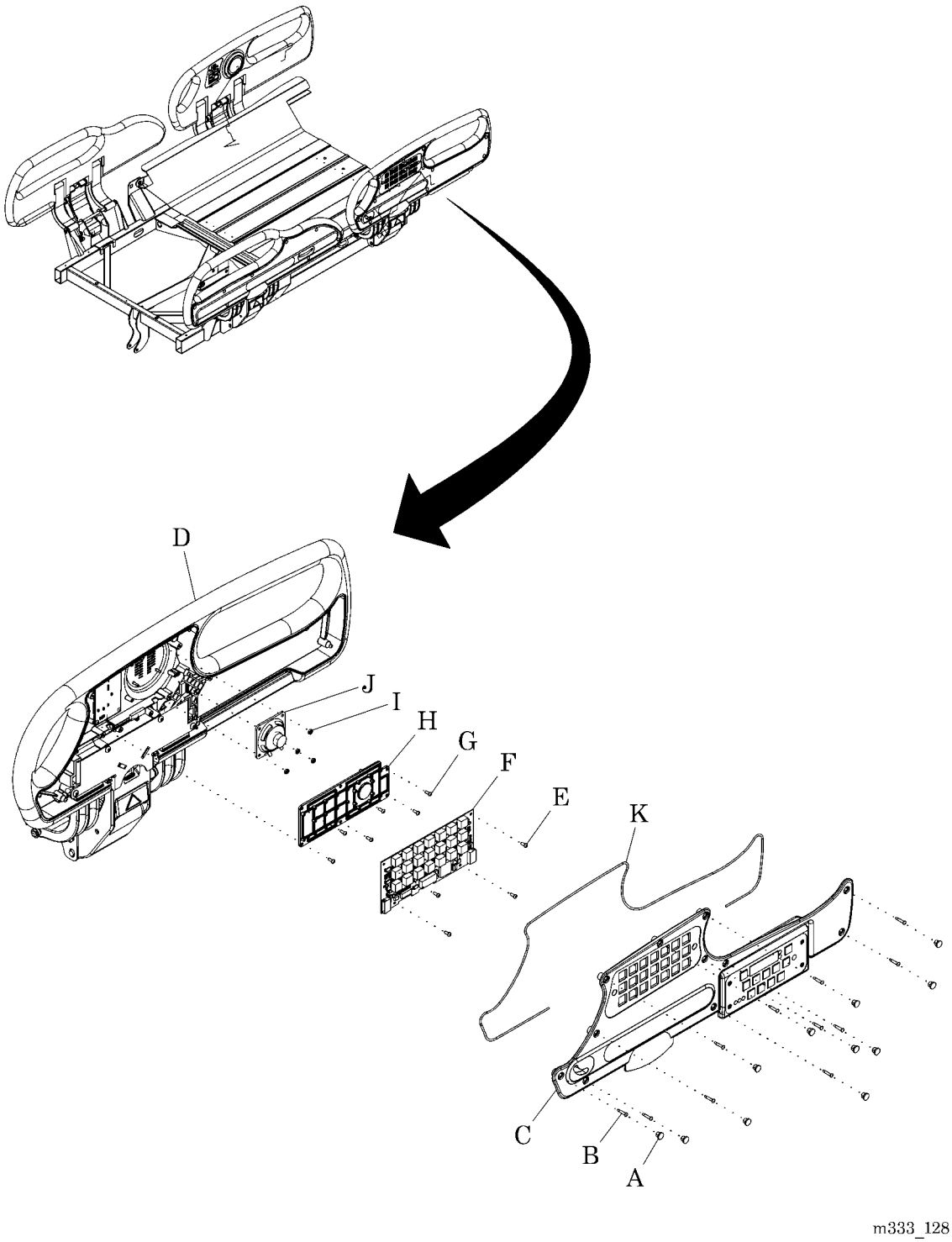
Figure 4-10. Speaker



15. Remove the speaker (J) from the siderail (D).

16. Disconnect the wires from the speaker (J).

Replacement

1. Make sure the gasket (K) is installed in the siderail.
2. Do the removal procedure in reverse order.
3. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.8 Patient Control P.C. Board

Tools required: T20 Torx®[1] screwdriver
T15 Torx® screwdriver
7/64" drill bit
Drill
#6-32 tap

Removal

1. Set the brakes.
2. Raise the bed to the high position.
3. Raise the appropriate siderail to the up and locked position.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

4. Unplug the bed from its power source.
5. Drill a hole in the center of each screw cover (A) (see figure 4-11 on page 4-25).
6. Using the tap, remove the screw covers (A).
7. Remove the 12 screws (B).
8. Remove the siderail cover (C) from the siderail (D).
9. Put the siderail cover (C) on the bed.
10. Remove the four screws (E) from the siderail P.C. board (F).
11. Fold down the P.C. board (F).
12. Remove the six screws (G) securing the stiffener (H) to the siderail (D).
13. Remove the stiffener (H).
14. Remove the four screws (I) securing the patient control P.C. board (J) to the siderail (D).

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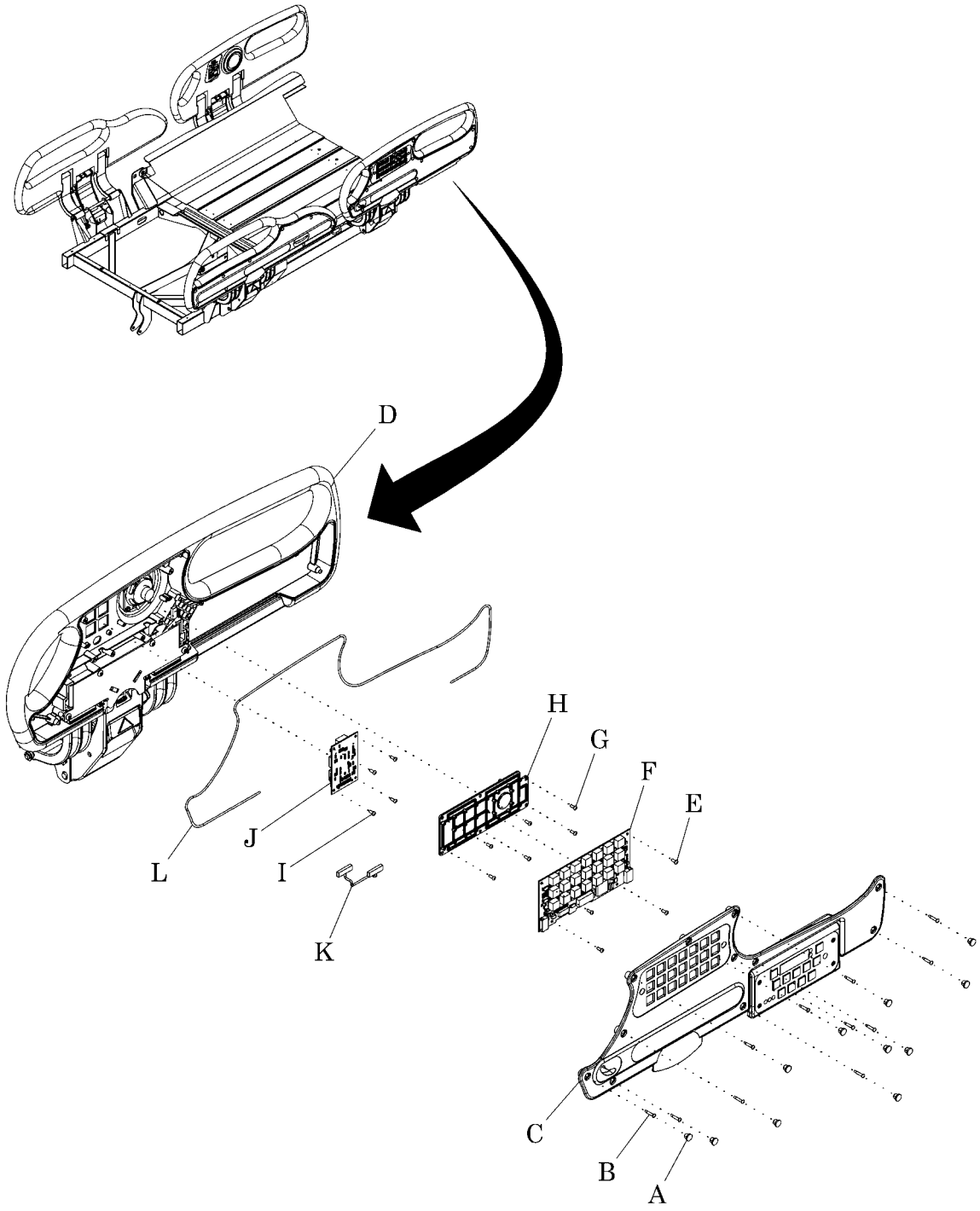
Figure 4-11. Patient Control P.C. Board



15. Remove the patient control P.C. board (J) from the siderail (D).

16. Remove the cable (K) between the patient control P.C. board (J) and the siderail P.C. board (F).

Replacement

1. Make sure the gasket (N) is installed in the pod (G).

2. Make sure the spring (O) is installed in the pod (G).

1. Make sure the gasket (L) is installed in the siderail (D).

2. Do the removal procedure in reverse order.

3. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.9 Control Pod P.C. Board

Tools required: T20 Torx®[1] screwdriver
T15 Torx® screwdriver
7/64" drill bit
Drill
#6-32 tap

Removal

1. Set the brakes.
2. Raise the bed to the high position.
3. Raise the appropriate siderail to the up and locked position.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

4. Unplug the bed from its power source.
5. Drill a hole in the center of each screw cover (A) (see figure 4-12 on page 4-28).
6. Using the tap, remove the screw covers (A).
7. Remove the 12 screws (B).
8. Remove the siderail cover (C) from the siderail (D).
9. Place the siderail cover (C) on the bed.
10. Remove the hinge pin (E) from the inside of the siderail cover (C).
11. Remove the bushing (F) from the inside of the siderail cover (C).
12. Remove the control pod (G) from the siderail cover (C).
13. Remove the label (H) from the control pod (G).
14. Remove the five screws (I) from the control pod (G).
15. Remove the upper half (J) of the control pod (G) from the lower half (K).

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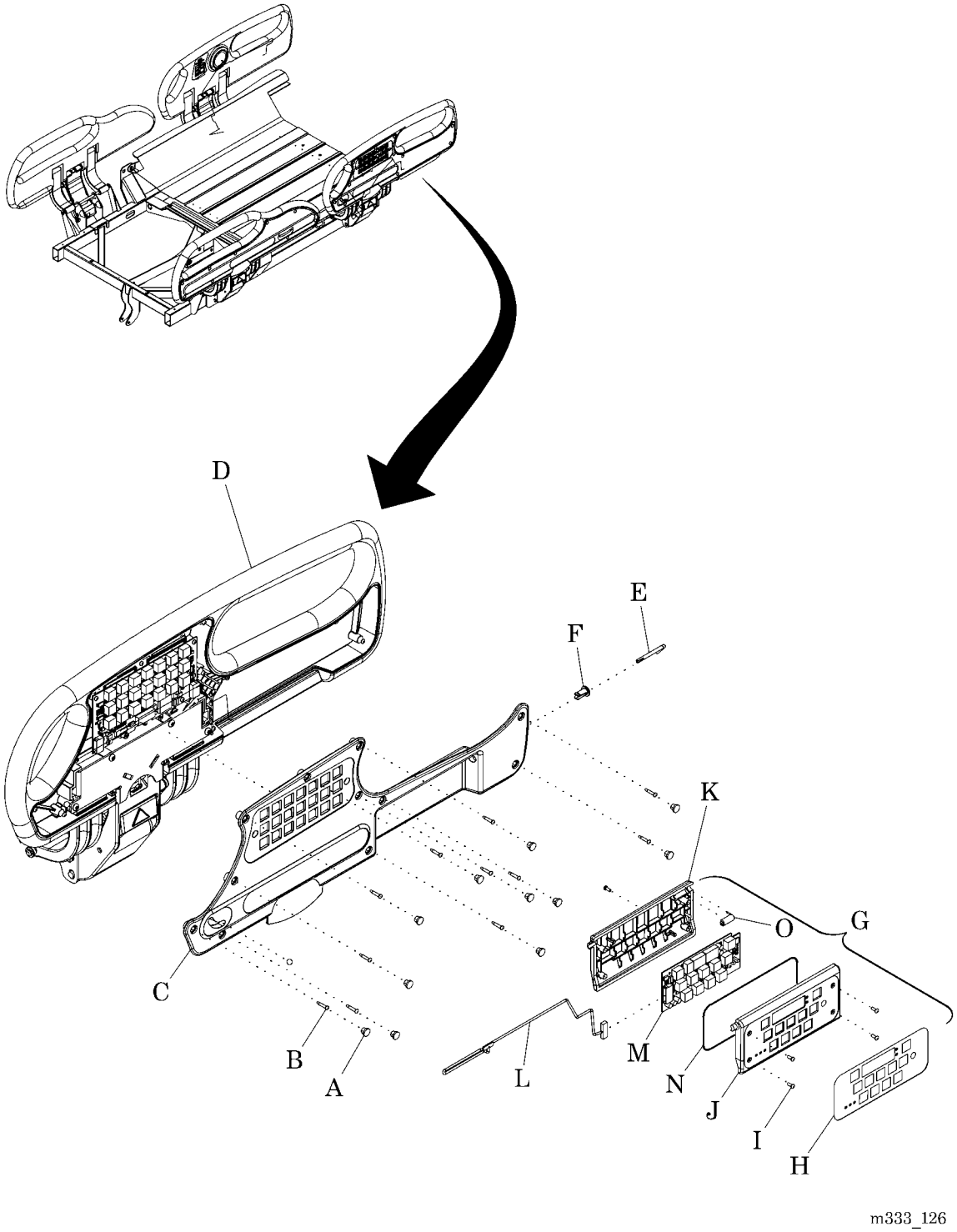
Figure 4-12. Control Pod P.C. Board



16. Disconnect the cable (L) from the P.C. board (M).

17. Remove the P.C. board (M) from the lower half (K) of the control pod (G).

Replacement

1. With the hinge pin (E) flat, install it by pushing it in until it hits the standoff.

2. Rotate the hinge pin (E) to clear the standoff, then push it in until seated.

3. Do the removal procedure in reverse order.

4. Install a new label (H).

5. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.10 Night Light

Tools required: T25 Torx®[1] screwdriver
Pliers
Wire cutters

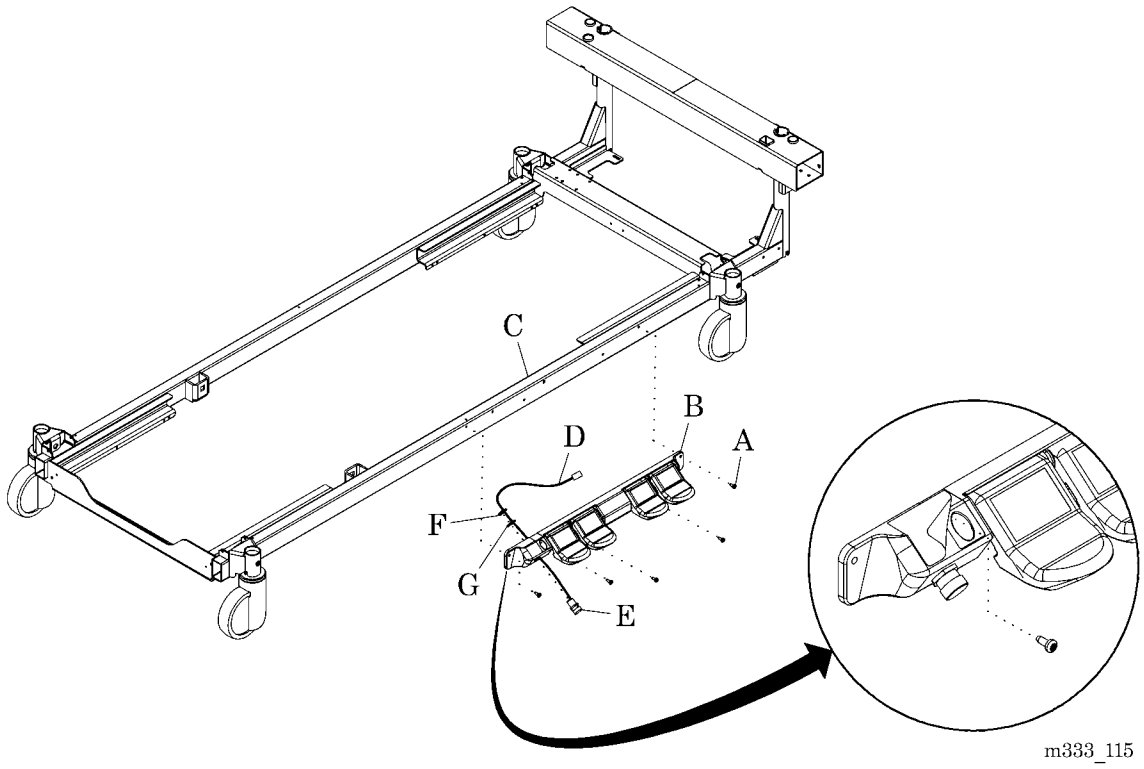
Removal

1. Set the brakes.
2. Raise the bed to the high position.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

3. Unplug the bed from its power source.
4. Remove the five screws (A) securing the foot pedal assembly (B) to the bed (C) (see figure 4-13 on page 4-30).

Figure 4-13. Night Light



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NOTE:
The fifth screw is located under the blank label.

5. Remove the foot pedal assembly (B) from the bed (C).
6. Remove the wire tie (not shown).
7. Disconnect the night light cable (D) from the foot pedal P.C. board.
8. Remove the nut (F) and washer (G) from the night light (E).
9. Remove the night light (E) from the foot pedal assembly (B).

Replacement

1. Do the removal procedure in reverse order.
2. Install a new blank label over the screw hole.
3. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.11 Foot Pedal Assembly

Tools required: T25 Torx®[1] screwdriver
Wire cutters

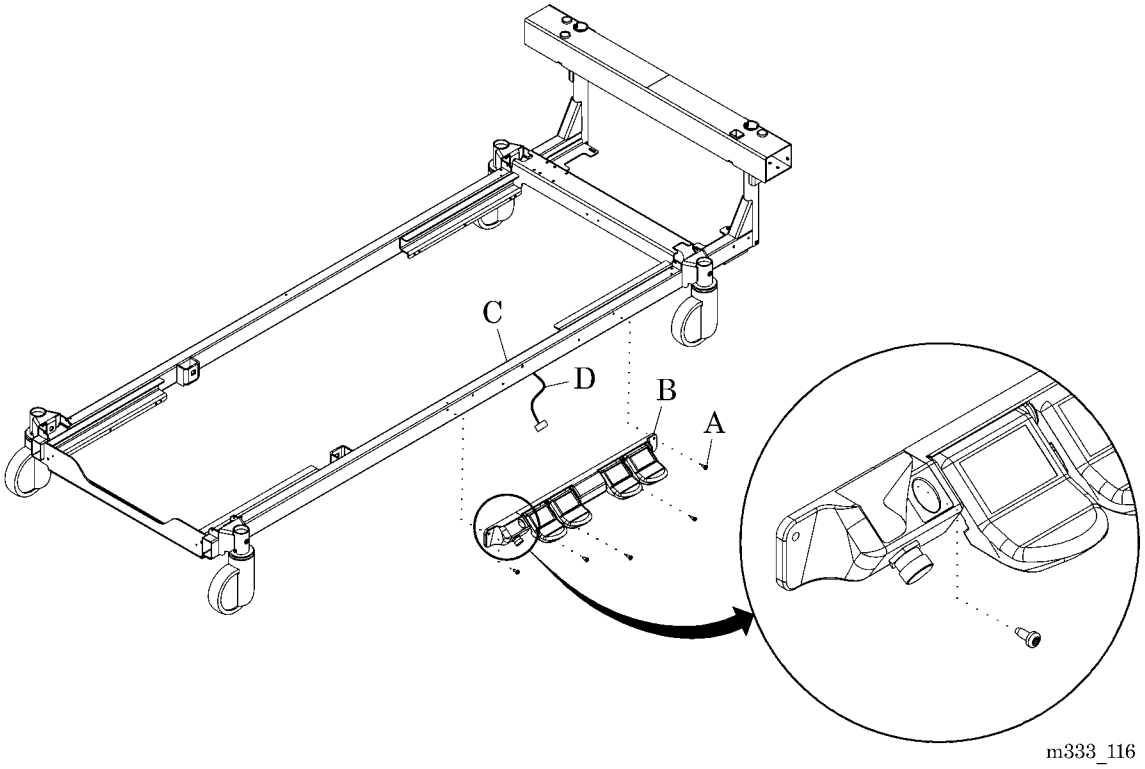
Removal

1. Set the brakes.
2. Raise the bed to the high position.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

3. Unplug the bed from its power source.
4. Remove the five screws (A) securing the foot pedal assembly (B) to the bed (C) (see figure 4-14 on page 4-32).

Figure 4-14. Foot Pedal Assembly



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NOTE:
The fifth screw is located under the blank label.

5. Remove the foot pedal assembly (B) from the bed (C).
6. Remove the cable tie (not shown).
7. Disconnect the cable (D) from the foot pedal assembly (B).

Replacement

1. Do the removal procedure in reverse order.
2. Install a new blank label over the screw hole.
3. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.12 Air Compressor

Tools required: T25 Torx®[1] screwdriver

Removal

1. Set the brakes.
2. Raise the bed to the high position.
3. Raise the head section to the highest position.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

4. Unplug the bed from its power source.
5. Remove the screws (A) securing the cover (B) to the bed (see figure 4-15 on page 4-35).
6. Remove the cover (B).
7. Remove the two screws (C) securing the electronics cover (D) to the electronics module (E).
8. Remove the electronics cover (D).
9. Disconnect the power cable (F).
10. Disconnect the air hose (G).
11. While supporting the air compressor (H), remove the two screws (I) lower the compressor (H).

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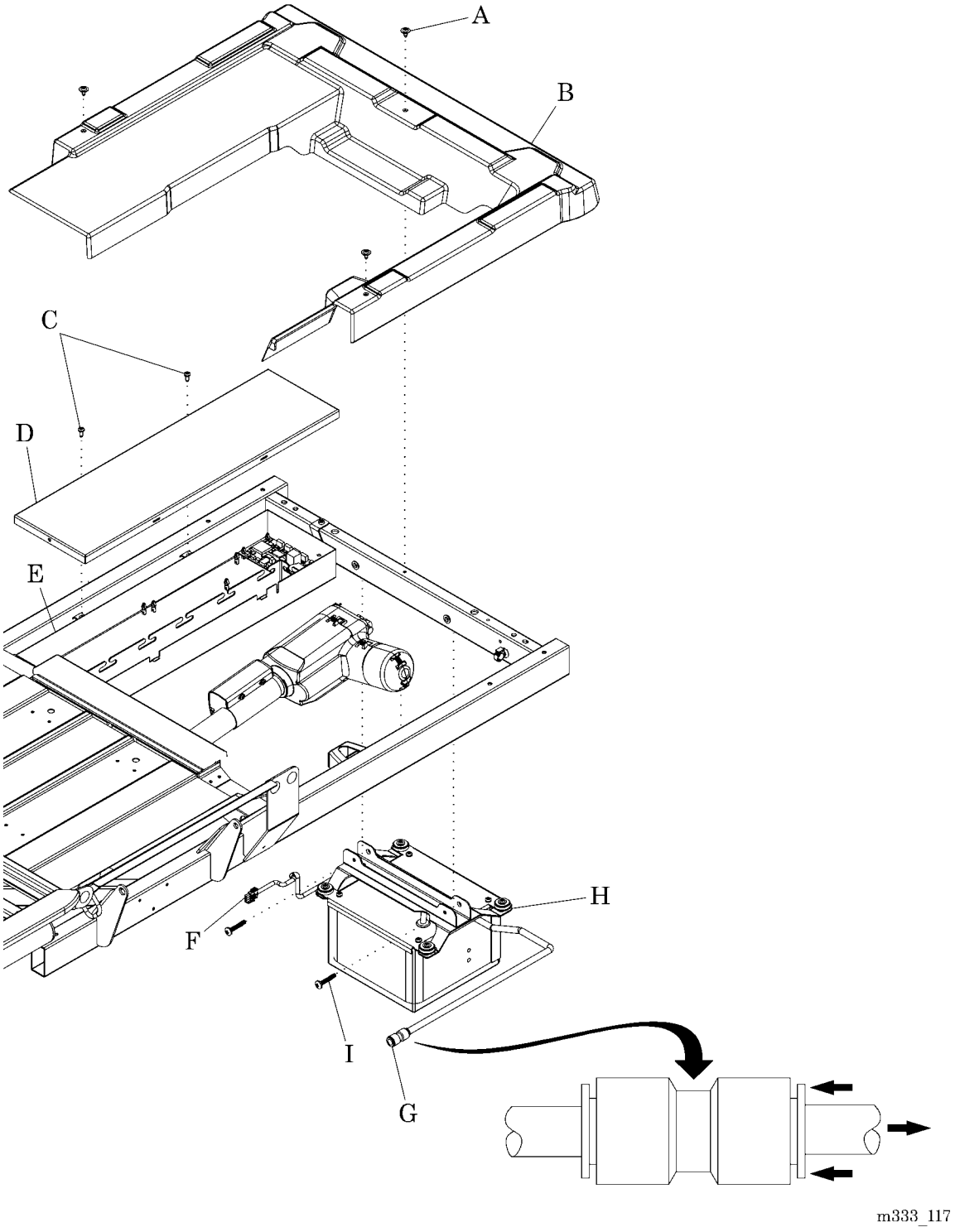
Figure 4-15. Air Compressor



Replacement

1. Do the removal procedure in reverse order.
2. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.13 Air Module

Tools required: T25 Torx®[1] screwdriver

Removal

1. Set the brakes.
2. Raise the bed to the high position.
3. Remove the mattress, (refer to procedure 4.1).
4. Raise the head section to the highest position.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

5. Unplug the bed from its power source.
6. Remove the 11 screws (A) securing the module cover (B) to the head section (C) (see figure 4-16 on page 4-38).
7. Remove the module cover (B).
8. Remove the two screws (D) securing the module (E) to the head section (C).
9. Disconnect all of the cables (F) on the module P.C. board (G) (see figure 4-17 on page 4-38).
10. Disconnect the air hose (H) from the hose connector (I).

NOTE:
Do not disconnect the air hoses between the manifold block and the P.C. board.

11. Carefully slide the module (E) out of the head section (C) (see figure 4-16 on page 4-38).

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Figure 4-16. Air Module Cover

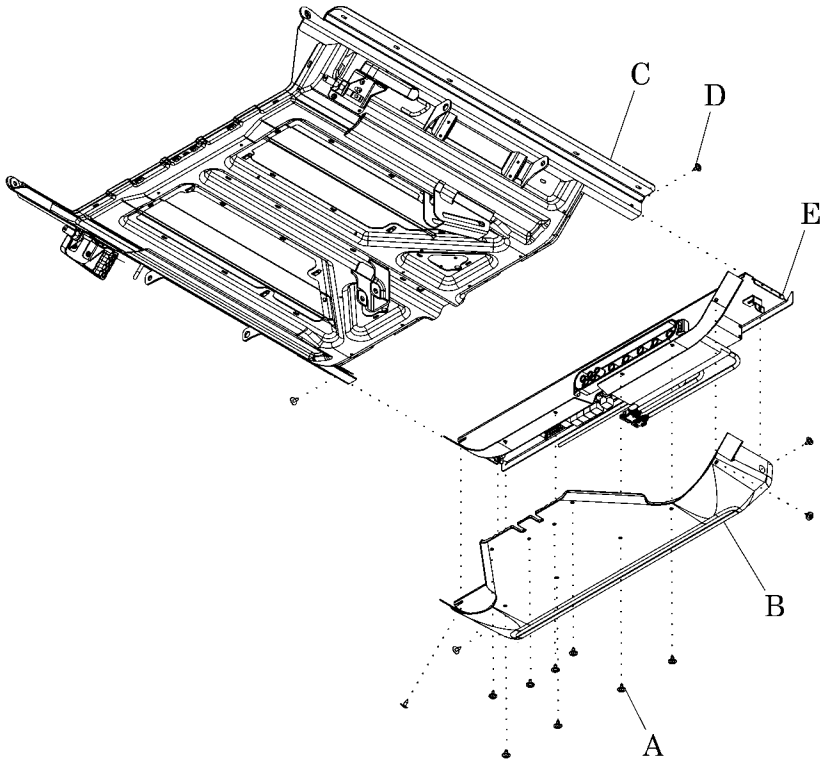

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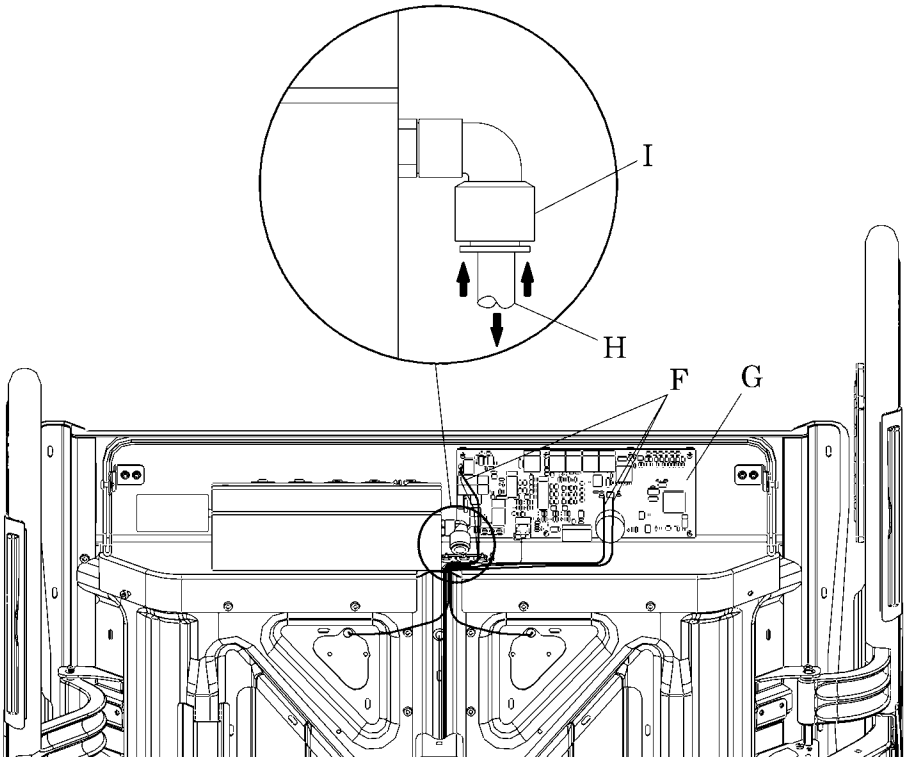
Figure 4-17. Air Module



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Replacement

1. Do the removal procedure in reverse order.
2. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.14 Foot Hilow Motor

Tools required: T25 Torx®[1] screwdriver
13 mm wrench
Antistatic strap
Wire cutters
Service kit—drive replacement (130016)

Removal

1. Set the brakes.
2. Raise the head section to the highest position.
3. Raise the knee section to the highest position.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could cause personal injury or equipment damage.

4. Unplug the bed from its power source.
5. Remove the three screws (A) that attach the cover (B) to the bed (C) (see figure 4-18 on page 4-41).
6. Remove the cover (B).
7. Remove the two screws (D) that attach the electronics module cover (E) to the electronics module (F).
8. Remove the electronics module cover (E).
9. Cut and remove any cable ties that attach the foot hilow drive cable to the electronics module (F).

CAUTION:
When handling electronic components, wear an antistatic strap. Failure to do so could cause component damage.

10. Put on the antistatic strap.
11. Disconnect the foot hilow drive cable from the motor control P.C. board inside the electronics module (F).

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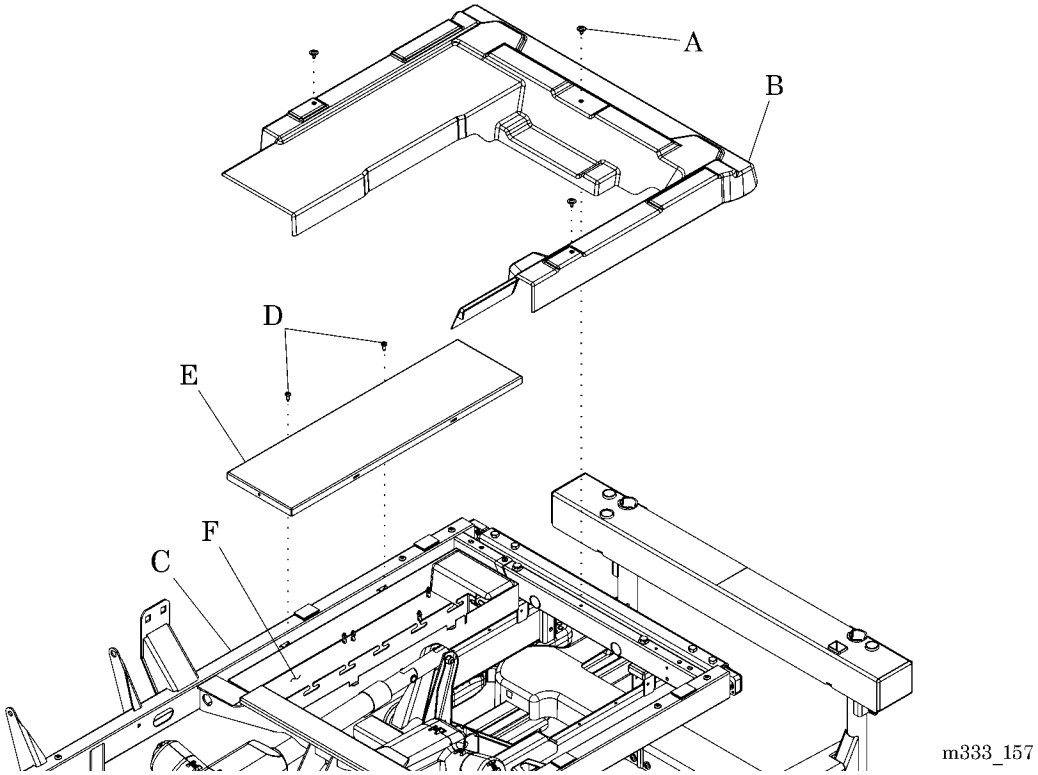
Figure 4-18. Cover Removal



12. Remove the drive cable from the bed.

13. If the bed is in the lowest position, do as follows, otherwise go to step 14:

    a. Put the scissor jack (G) under the torque tube (H) (see figure 4-19 on page 4-42).

    b. Raise the jack (G) so there is approximately 6" (15 cm) between the intermediate frame (I) and the base frame (J).

NOTE:
It may be necessary to push down on the base frame to separate the intermediate frame from the base frame.

    c. Remove the jack (G).

14. Install the hoist (K) so the hooks (L) catch on the shafts (M) (see figure 4-20 on page 4-43).

NOTE:
If the IntelliDrive® Transport System drive box is installed, the hoist goes on top of the drive box.

Figure 4-19. Scissor Jack Position

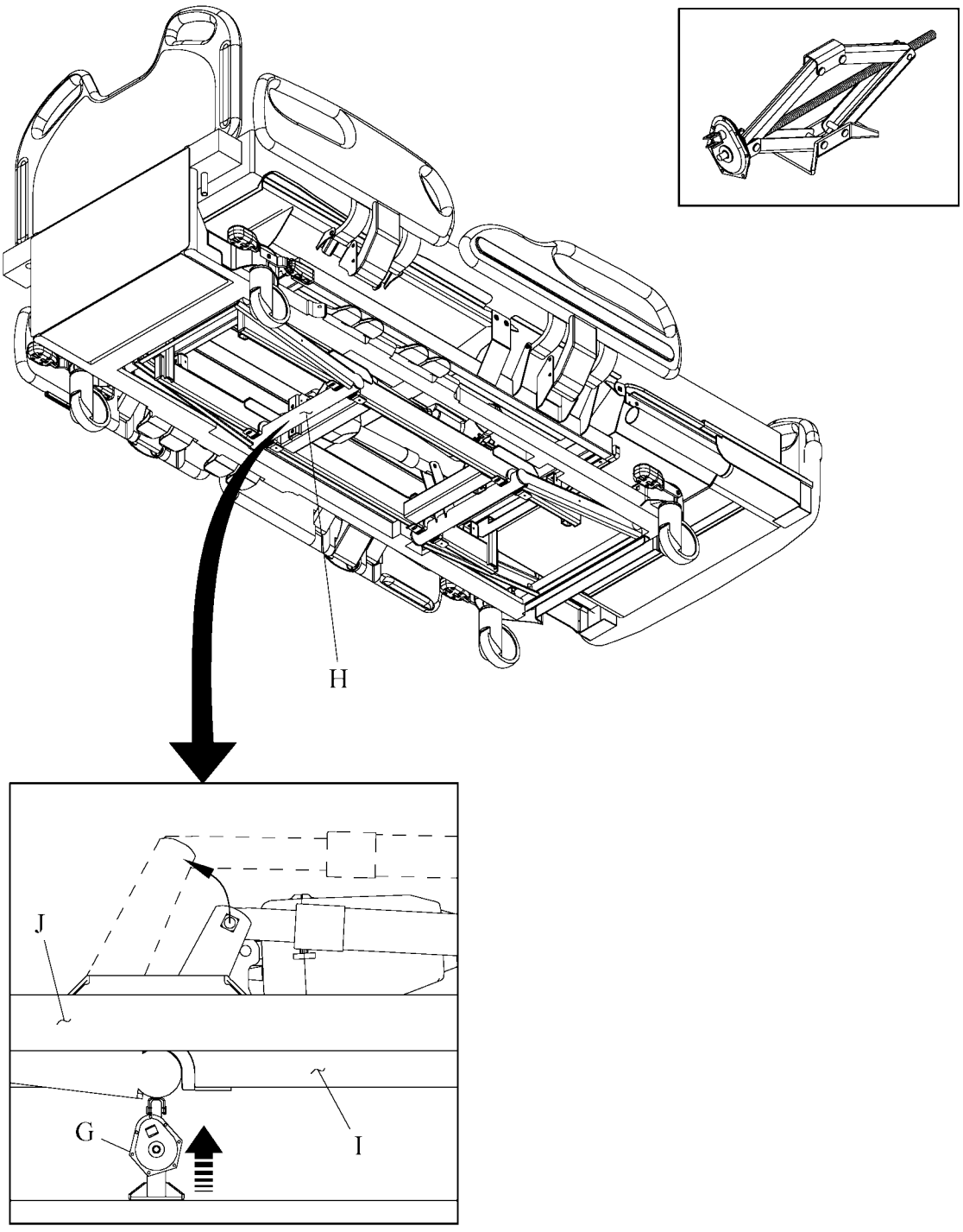
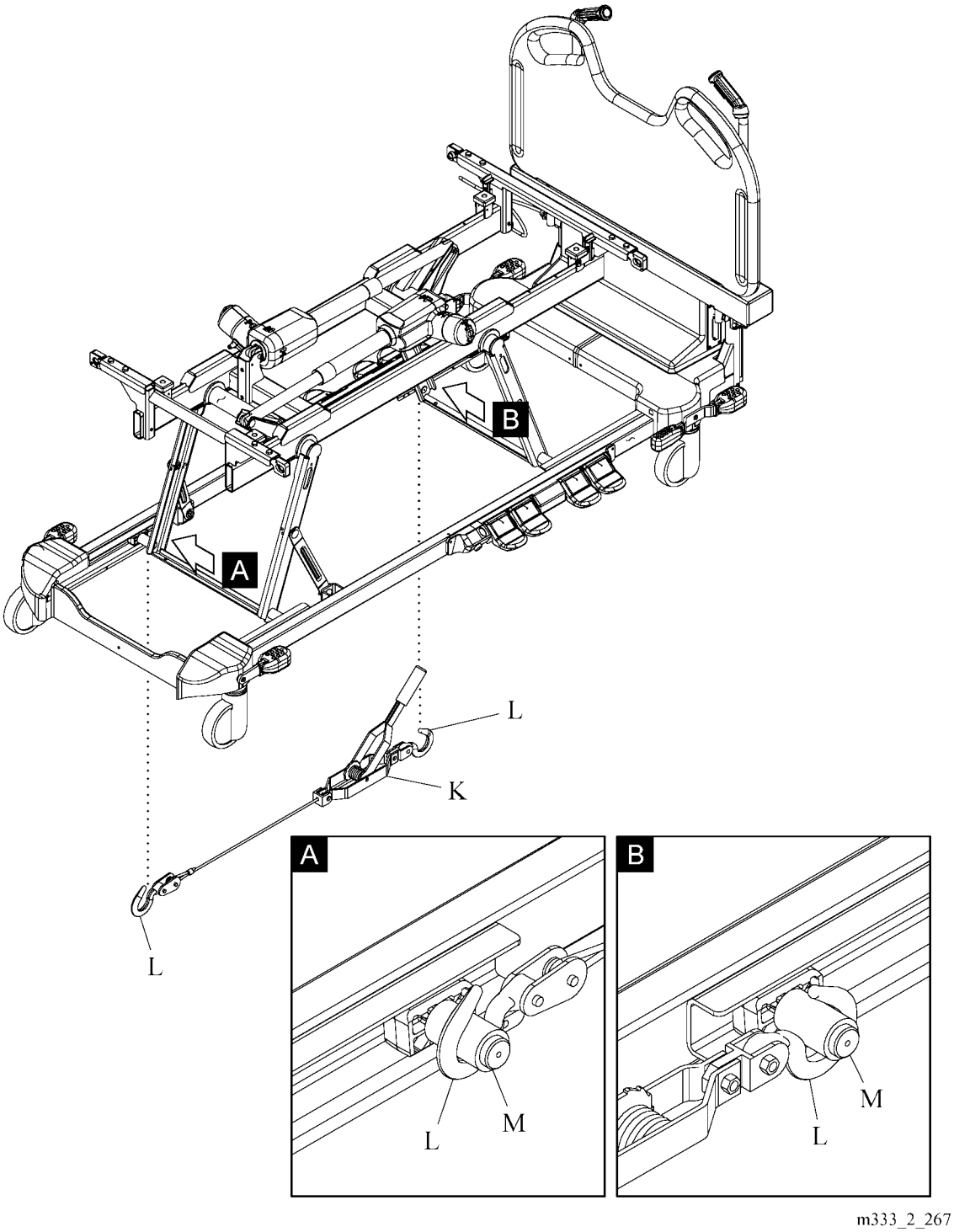


Figure 4-20. Hoist Installation



15. Tighten the hoist (K) enough to remove pressure from the mounting pins on the foot hilow drive.

16. Remove the rue ring (N) from the pin (O) on the motor end of the foot hilow drive (P) (see figure 4-21 on page 4-45).

17. Remove the nut (R) from the bolt (Q) on the shaft end of the foot hilow drive (P).

18. While supporting the drive (P), remove the pin (O) from the motor end.

19. While supporting the drive (P), remove the bolt (Q) from the shaft end.

20. Remove the drive (P) from the bed.

Replacement

1. Install the motor end of the new motor into the bed.

2. Connect the motor cable to the motor control P.C. board.

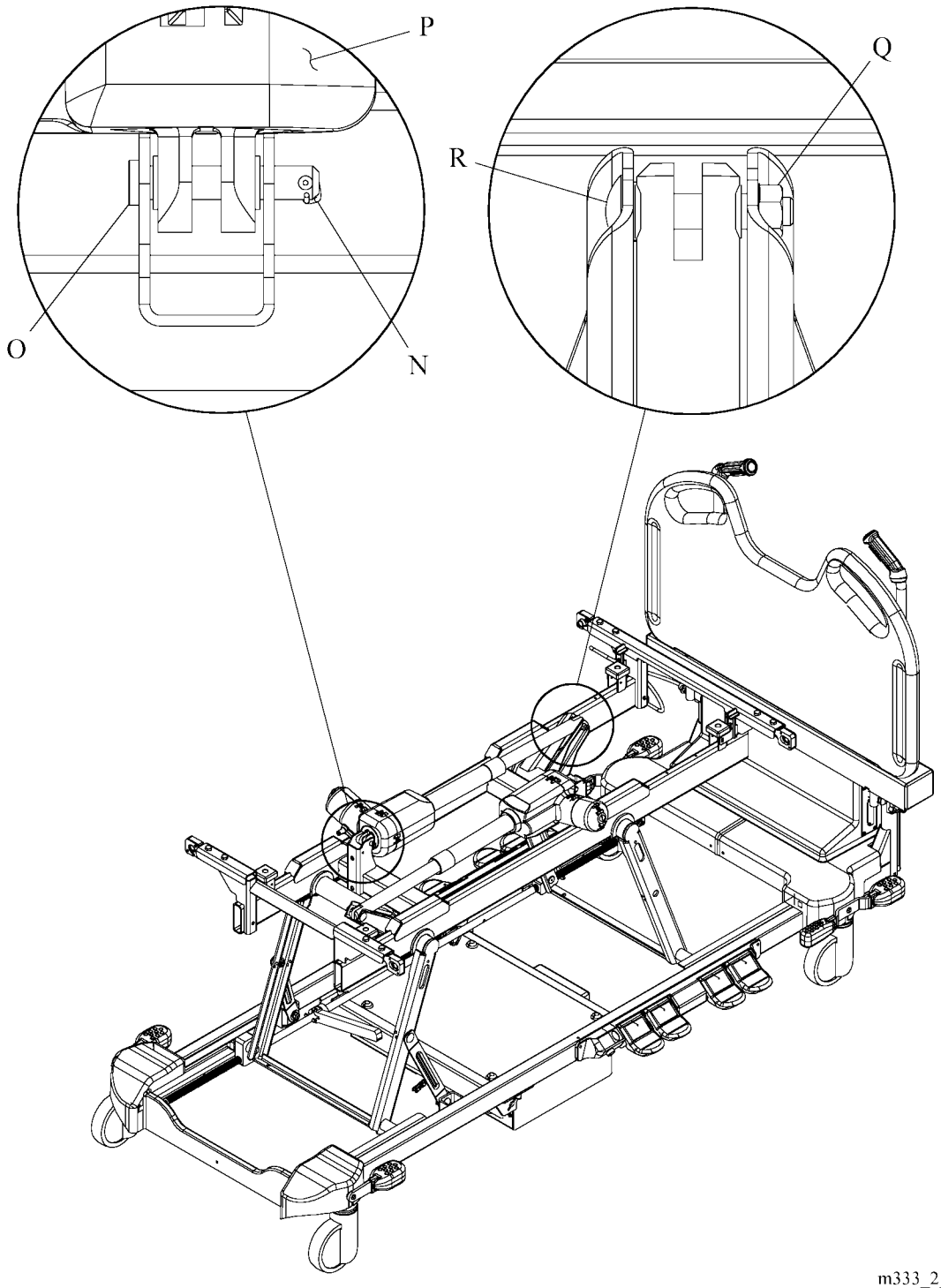
3. Plug the bed into an appropriate power source.

4. Operate the hilow function as necessary to align the shaft end of the motor with the lift arm on the bed.

5. Do the removal procedure in reverse order.

6. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

Figure 4-21. Motor Removal



4.15 Head Hilow Motor

Tools required: T25 Torx®[1] screwdriver
13 mm wrench
Antistatic strap
Wire cutters
Service kit—drive replacement (130016)

Removal

1. Set the brakes.
2. Raise the head section to the highest position.
3. Raise the knee section to the highest position.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could cause personal injury or equipment damage.

4. Unplug the bed from its power source.
5. Remove the three screws (A) that attach the cover (B) to the bed (C) (see figure 4-22 on page 4-47).
6. Remove the cover (B).
7. Remove the two screws (D) that attach the electronics module cover (E) to the electronics module (F).
8. Remove the electronics module cover (E).

CAUTION:
When handling electronic components, wear an antistatic strap. Failure to do so could cause component damage.

9. Put on the antistatic strap.
10. Cut and remove any cable ties that attach the head hilow drive cable to the electronics module (F).
11. Disconnect the head hilow drive cable from the motor control P.C. board inside the electronics module (F).

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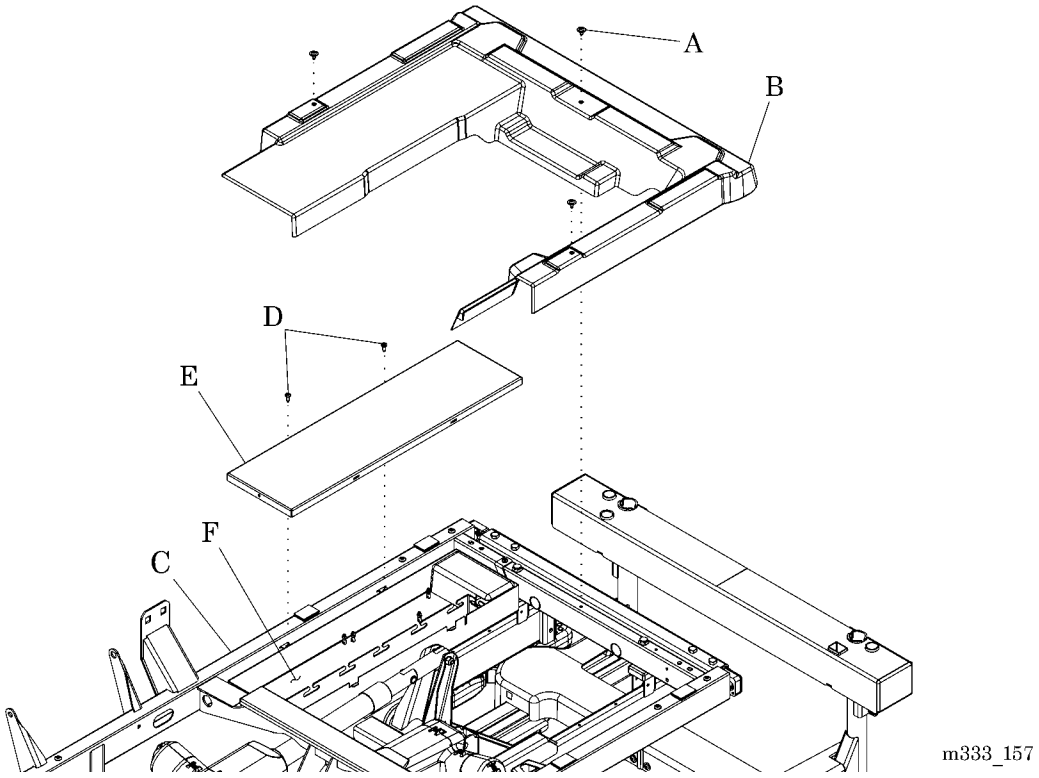
Figure 4-22. Cover Removal



12. Remove the drive cable from the bed.
13. Remove the two screws (not shown) that attach the electronics module (F) to the bed (C).
14. Move the electronics module (F) to the side.
15. It is not necessary to disconnect the cables inside the electronics module.
16. If the bed is in the lowest position, do as follows, otherwise go to step 17:
    a. Put the scissor jack (G) under the torque tube (H) (see figure 4-23 on page 4-48).
    b. Raise the jack (G) so there is approximately 6" (15 cm) between the intermediate frame (I) and the base frame (J).
    c. It may be necessary to push down on the base frame to separate the intermediate frame (I) from the base frame (J).
    d. Remove the jack (G).
17. Install the hoist (K) so the hooks (L) catch on the shafts (M) (see figure 4-24 on page 4-49).

Figure 4-23. Scissor Jack Position

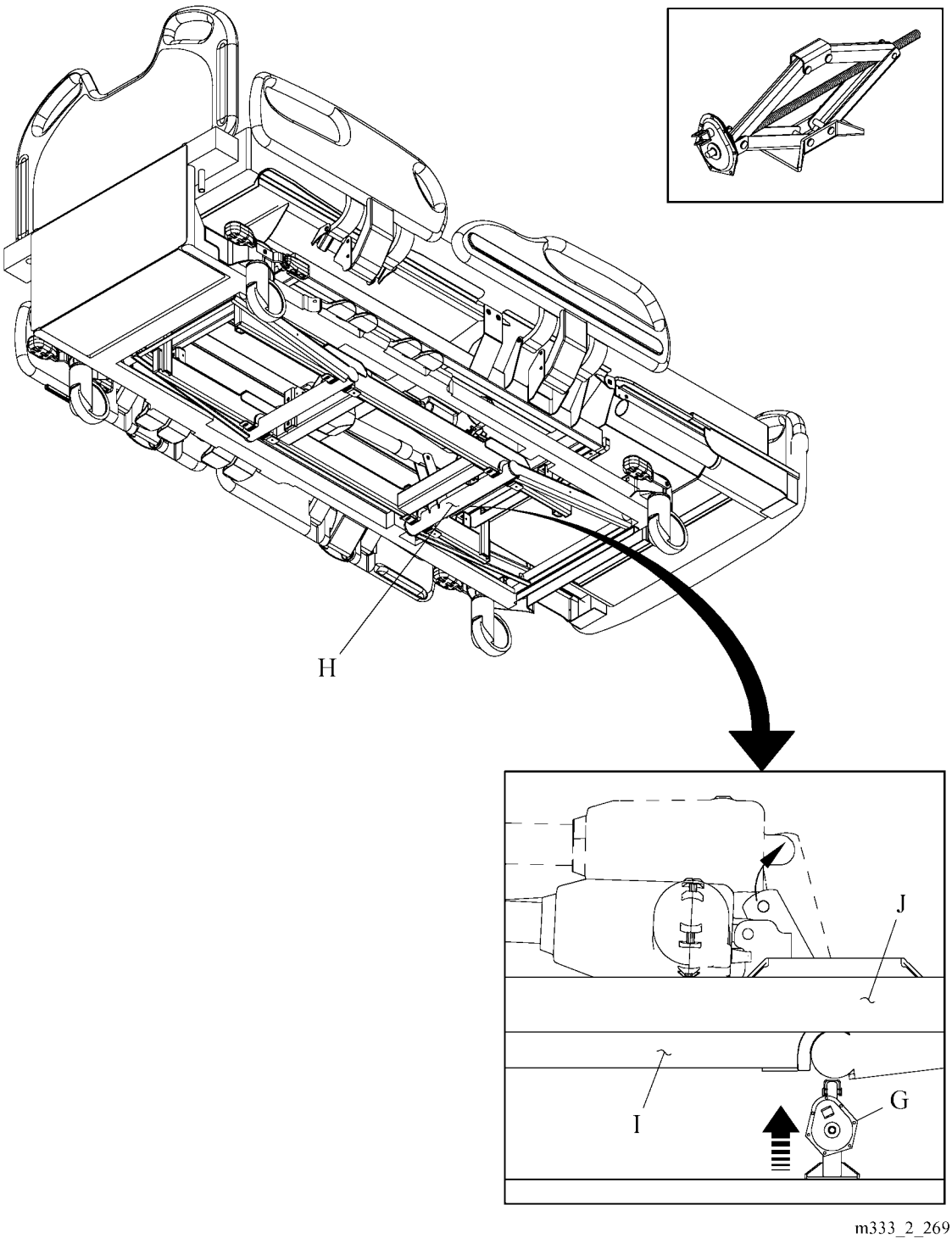
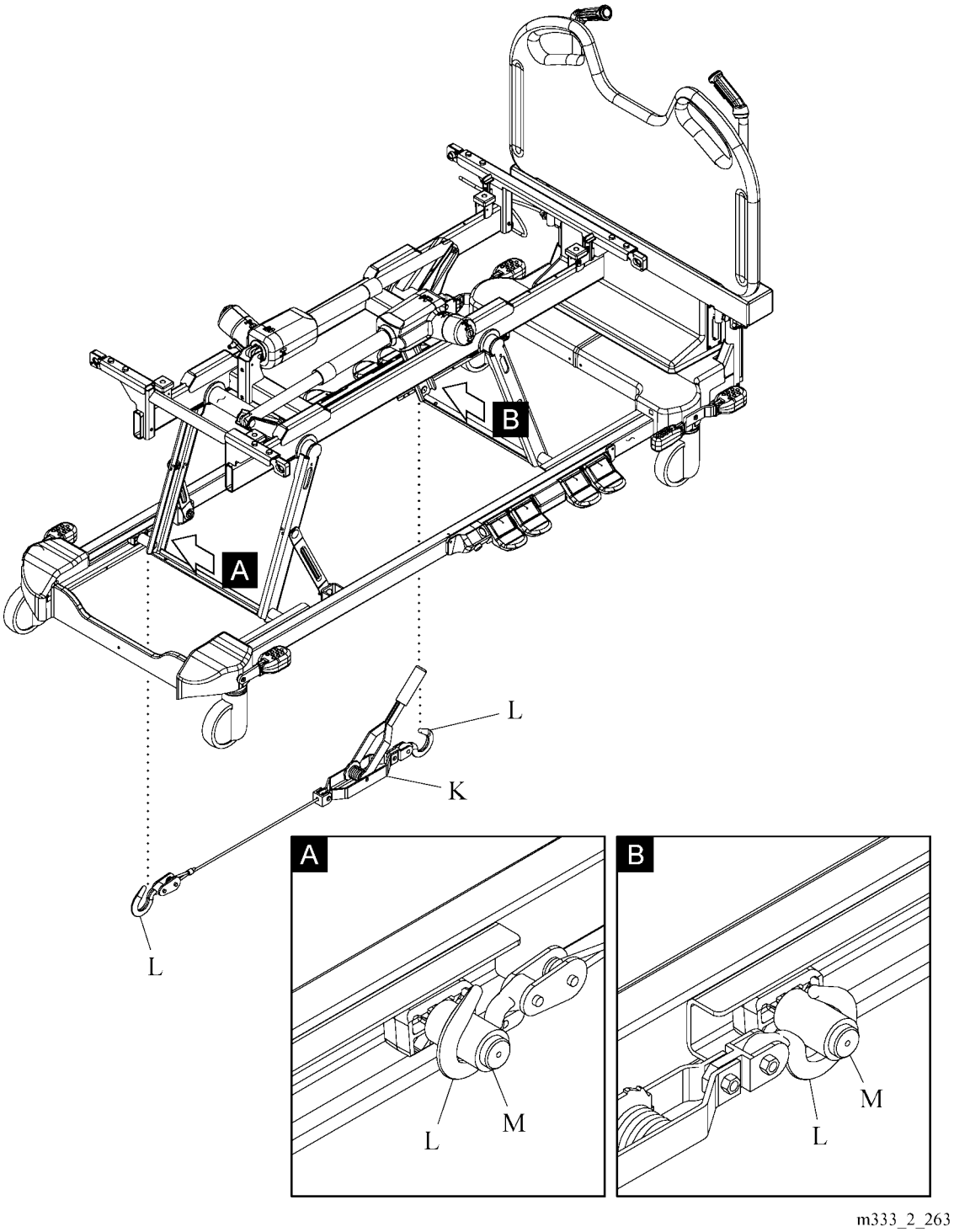


Figure 4-24. Hoist Installation



18. If the IntelliDrive® Transport System drive box is installed, the hoist goes on top of the drive box.

19. Tighten the hoist (K) enough to remove pressure from the mounting pins on the head hilow drive.

20. Remove the rue ring (N) from the pin (O) on the motor end of the head hilow drive (P) (see figure 4-25 on page 4-51).

21. Remove the nut (R) from the bolt (Q) on the shaft end of the head hilow drive (P).

22. While supporting the drive (P), remove the pin (O) from the motor end.

23. While supporting the drive (P), remove the bolt (Q) from the shaft end.

24. Remove the drive (P) from the bed.

Replacement

1. Install the motor end of the new motor into the bed.

2. Connect the motor cable to the motor control P.C. board.

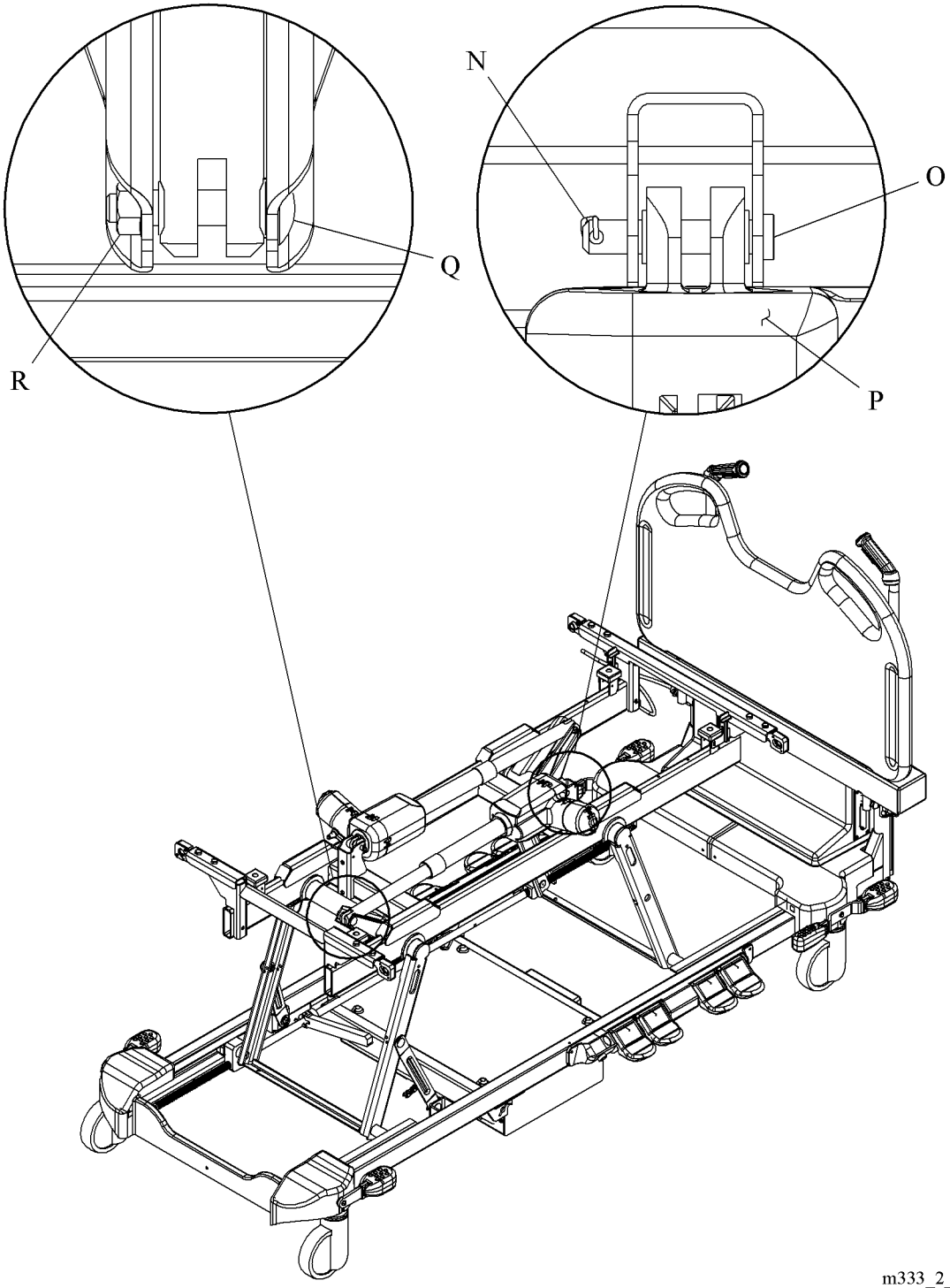
3. Plug the bed into an appropriate power source.

4. Operate the hilow function as necessary to align the shaft end of the motor with the lift arm on the bed.

5. Do the removal procedure in reverse order.

6. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

Figure 4-25. Motor Removal



4.16 Head Section Motor

Tools required: T25 Torx®[1] screwdriver
Wire cutters
13 mm wrench
2" x 4" x 36" piece of wood

Removal

1. Set the brakes.
2. Raise the bed to the high position.
3. Using the CPR release, raise the head section to the highest position.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

4. Unplug the bed from its power source.
5. Disconnect the CPR cables from the motor (refer to procedure 4.3).
6. Remove the screws (A) securing the cover (B) to the head section (C) (see figure 4-26 on page 4-53).
7. Remove the cover (B).
8. If the bed is a non-air bed, disconnect the head section motor adapter cable (not shown).
9. If the bed is an air bed, disconnect the head section motor from the air module P.C. board.

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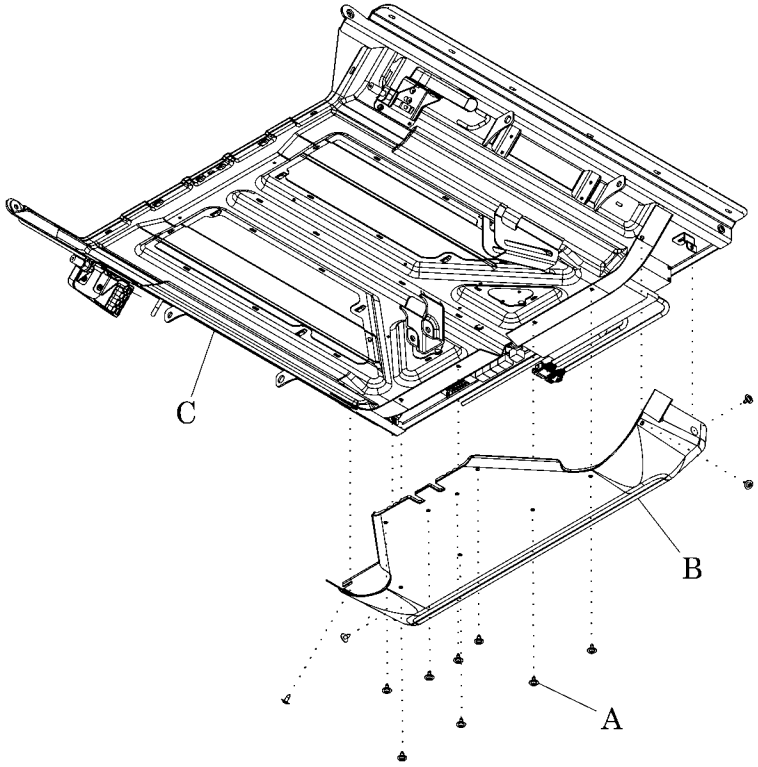
Figure 4-26. Cover Removal



10. Put the piece of wood between the head section and the weigh frame.
11. Remove the two screws (D) securing the cable cover (E) to the CPR control box (F) (see figure 4-27 on page 4-54).
12. Remove the pin (G) from the CPR actuator pin (H).
13. Slide the CPR control box (F) down to clear the CPR actuator pin (H).
14. Remove the nut (I) from the bolt (J) (see figure 4-28 on page 4-55).
15. Remove the bolt (J) from the mounting bracket (L).
16. Remove the rue ring (M) from the pin (N) on the motor end of the motor (K).
17. While supporting the motor (K), remove the pin (N) from the motor (K).
18. Remove the motor (K) from the head section.

Figure 4-27. CPR Actuator

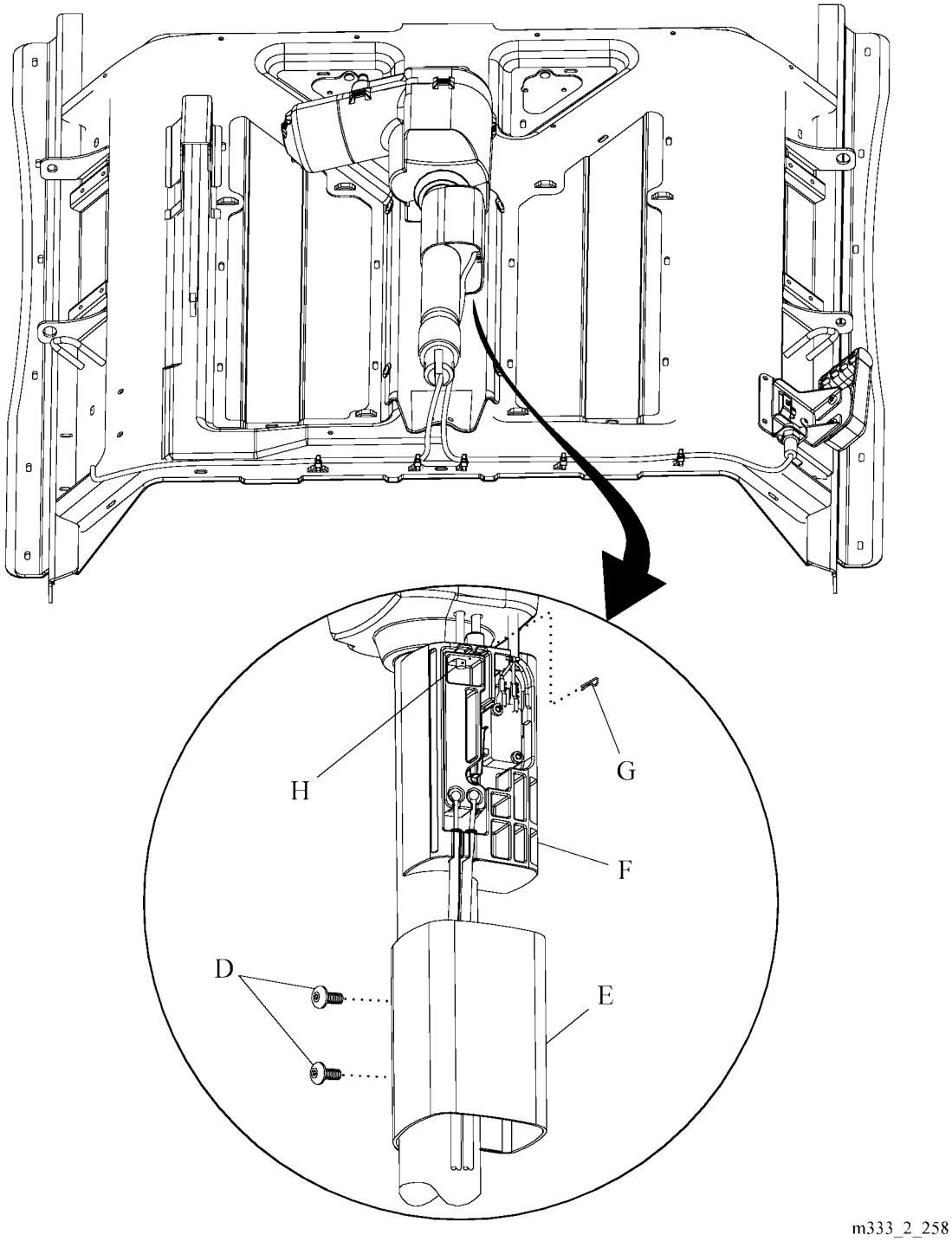
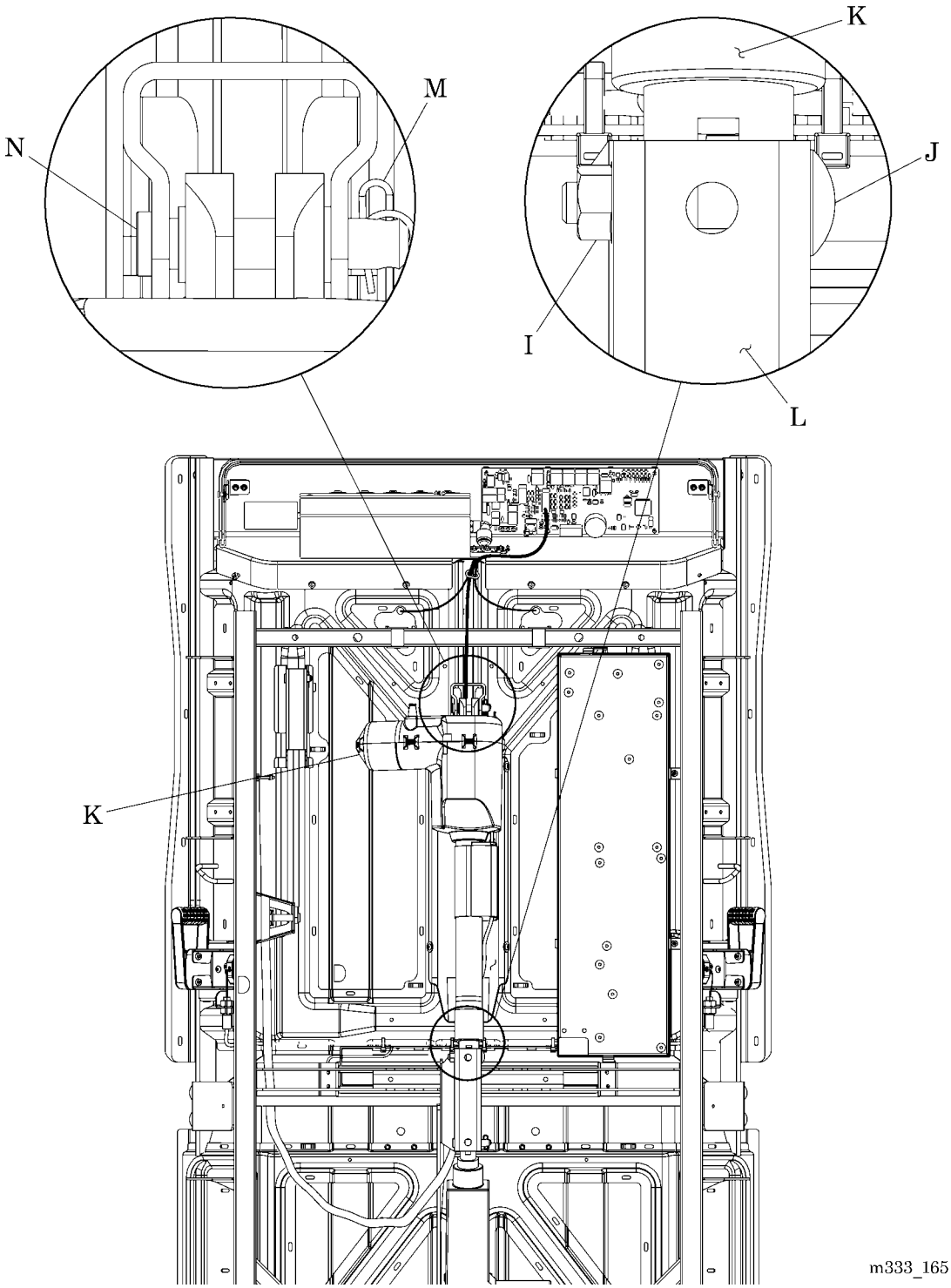


Figure 4-28. Motor Removal



Replacement

1. Do the removal procedure in reverse order.

NOTE:
Connecting the head section motor, and then extending or retracting the motor to align the mount pins may be required.

2. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.17 Knee Section Motor

Tools required: T25 Torx®[1] screwdriver
Wire cutters
13 mm wrench
Jack stands

Removal

1. Set the brakes.
2. Raise the bed to the high position.
3. Raise the head section to the highest position.
4. Place the jack stands under the knee section.
5. Carefully lower the bed onto the jack stands to relieve pressure on the knee motor.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

6. Unplug the bed from its power source.
7. Remove the screws (A) securing the cover (B) to the bed (C) (see figure 4-29 on page 4-58).
8. Remove the cover (B).
9. Remove the two screws (D) securing the electronics module cover (E) to the electronics module (F).
10. Remove the electronics module cover (E).
11. Disconnect the knee section motor from the motor control P.C. board inside the electronics module (F).
12. Cut and remove any cable ties securing the motor cable (G) to the bed frame (H) (see figure 4-30 on page 4-59).
13. Remove the rue ring (J) from the pin (K) at the foot end of the motor (L).

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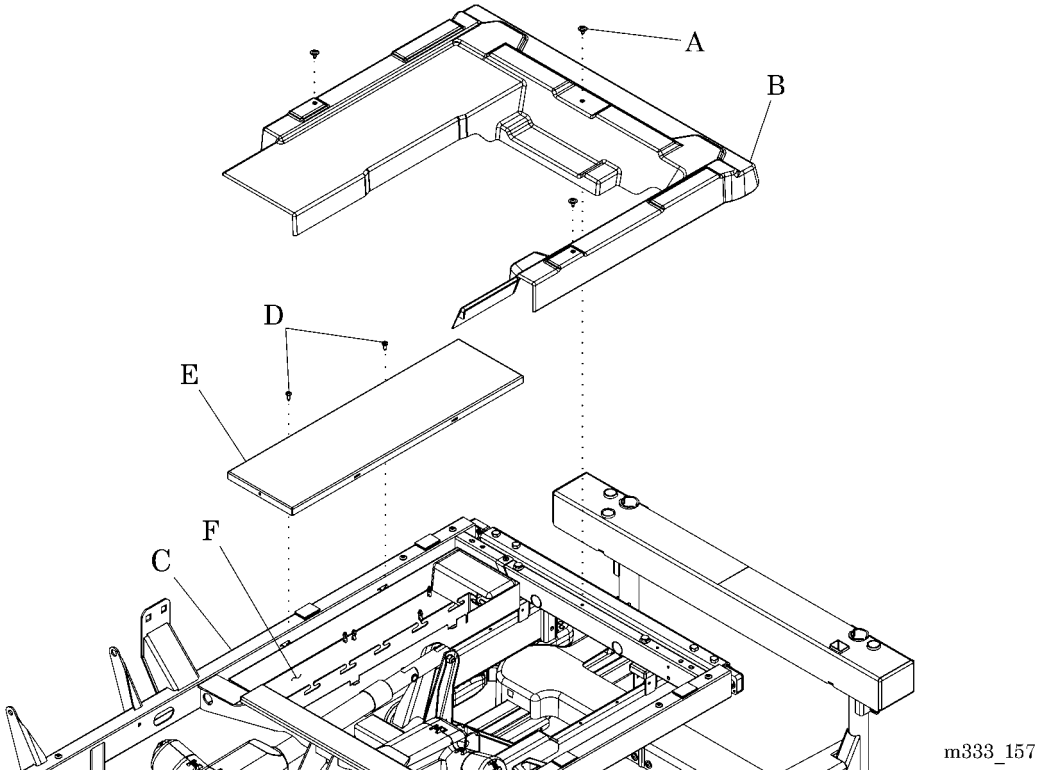
14. Remove the rue ring (M) from the pin (N) at the head end of the motor (L).

Figure 4-29. Cover Removal

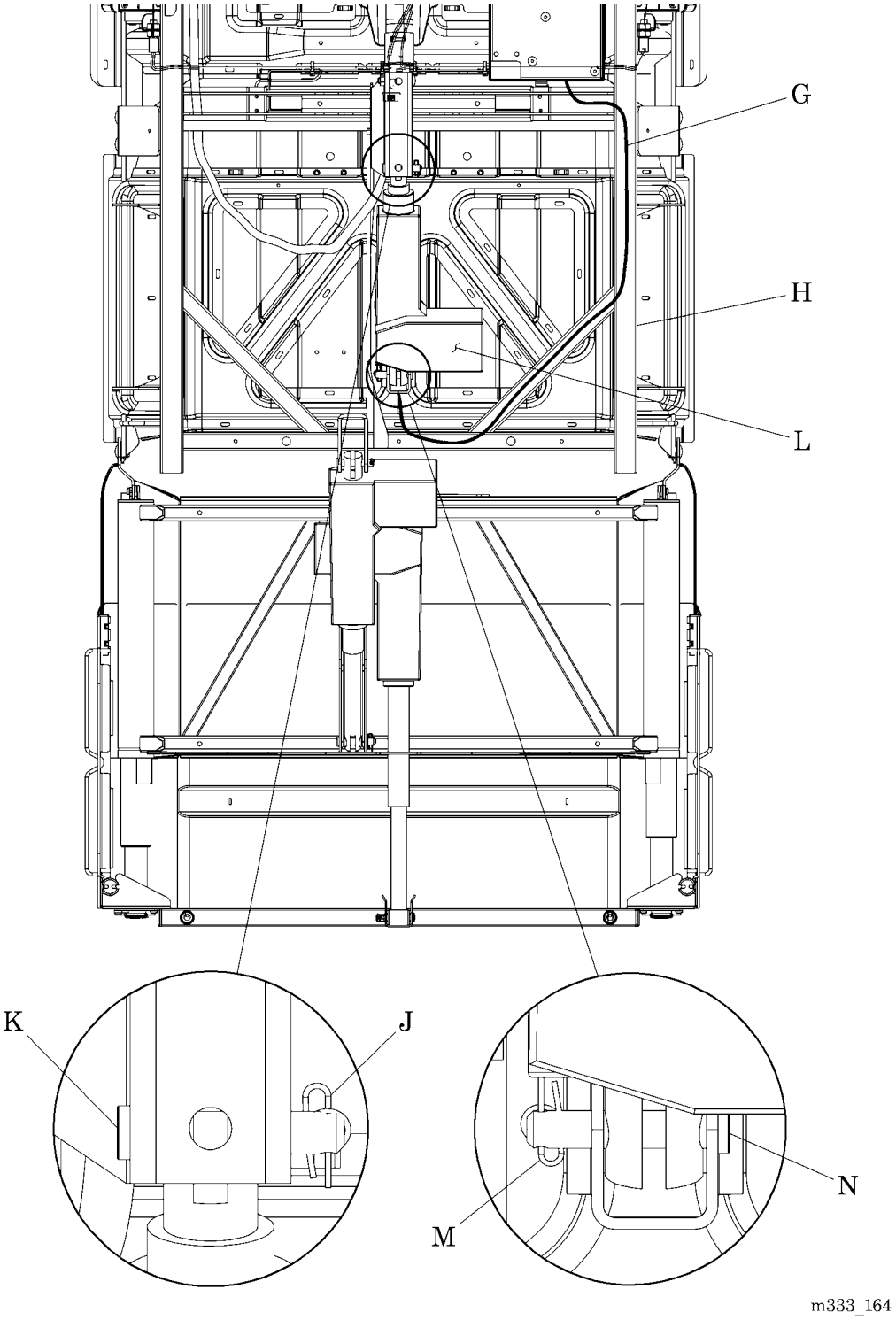


15. While supporting the motor (L), remove the foot end pin (K).

16. While supporting the motor (L), remove the head end pin (N).

17. Remove the motor (L) from the bed.

Figure 4-30. Motor Removal



Replacement

1. Do the removal procedure in reverse order.

NOTE:
Connecting the knee motor, and then extending or retracting the motor to align the mount pins may be required.

2. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.18 Foot Motor

Tools required: T25 Torx®[1] screwdriver
Wire cutters
Jack stands

Removal

1. Set the brakes.
2. Raise the bed to the high position.
3. Raise the head section to the highest position.
4. Put the jack stands under the foot section.
5. Carefully lower the bed onto the jack stands to relieve pressure on the foot motor.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

6. Unplug the bed from its power source.
7. Remove the screws (A) securing the cover (B) to the bed (C) (see figure 4-31 on page 4-62).
8. Remove the cover (B).
9. Remove the two screws (D) securing the electronics module cover (E) to the electronics module (F).
10. Remove the electronics module cover (E).
11. Disconnect the foot section motor from the motor control P.C. board inside the electronics module (F).
12. Cut and remove any cable ties securing the motor cable (G) to the bed frame (H) (see figure 4-32 on page 4-63).
13. Remove the rue ring (I) from the pin (J) at the foot end of the motor (K).
14. Remove the rue ring (L) from the pin (M) at the head end of the motor (K).

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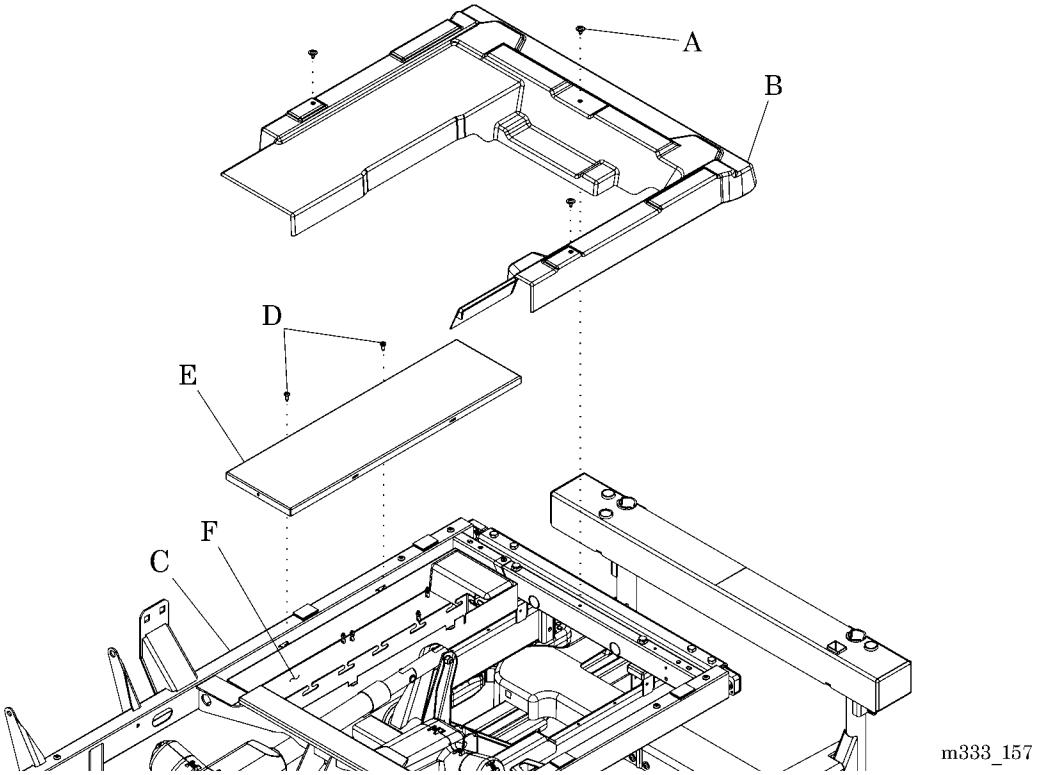
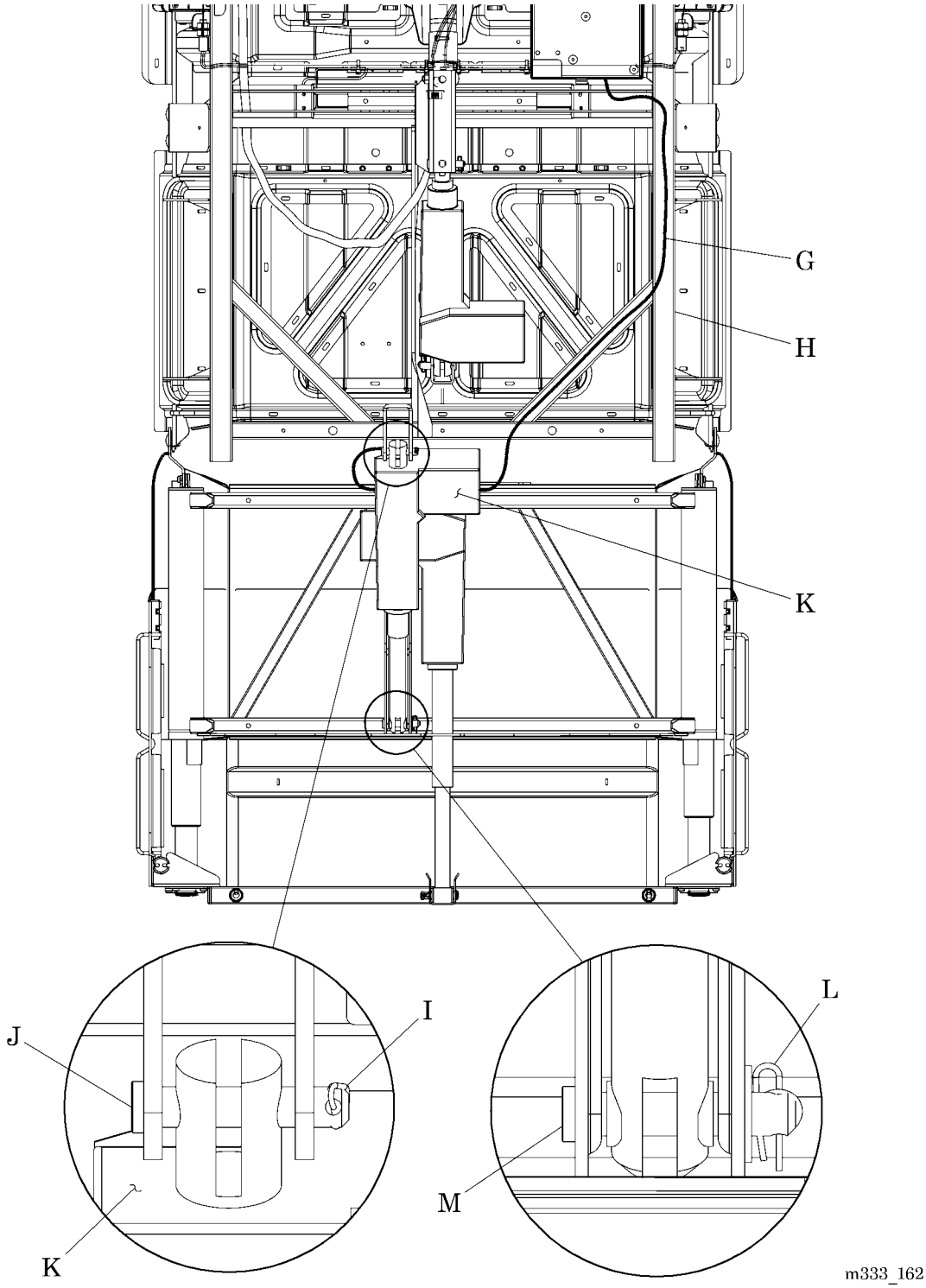
Figure 4-31. Cover Removal



15. While supporting the motor (K), remove the foot end pin (J).
16. While supporting the motor (K), remove the head end pin (M).
17. Remove the motor (K) from the bed.

Figure 4-32. Motor Removal



Replacement

1. Do the removal procedure in reverse order.

NOTE:
Connecting the foot motor, and then extending or retracting the motor to align the mount pins may be required.

2. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.19 Foot Extend Motor

Tools required: T25 Torx®[1] screwdriver
Wire cutters

Removal

1. Set the brakes.
2. Raise the bed to the high position.
3. Raise the head section to the highest position.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

4. Unplug the bed from its power source.
5. Remove the screws (A) securing the cover (B) to the bed (C) (see figure 4-33 on page 4-66).
6. Remove the cover (B).
7. Remove the two screws (D) securing the electronics module cover (E) to the electronics module (F).
8. Remove the electronics module cover (E).
9. Disconnect the foot section motor from the motor control P.C. board inside the electronics module (F).
10. Cut and remove any cable ties securing the motor cable (G) to the bed frame (H) (see figure 4-34 on page 4-67).
11. Remove the rue ring (I) from the pin (J) at the foot end of the motor (K).
12. Remove the rue ring (L) from the pin (M) at the head end of the motor (K).

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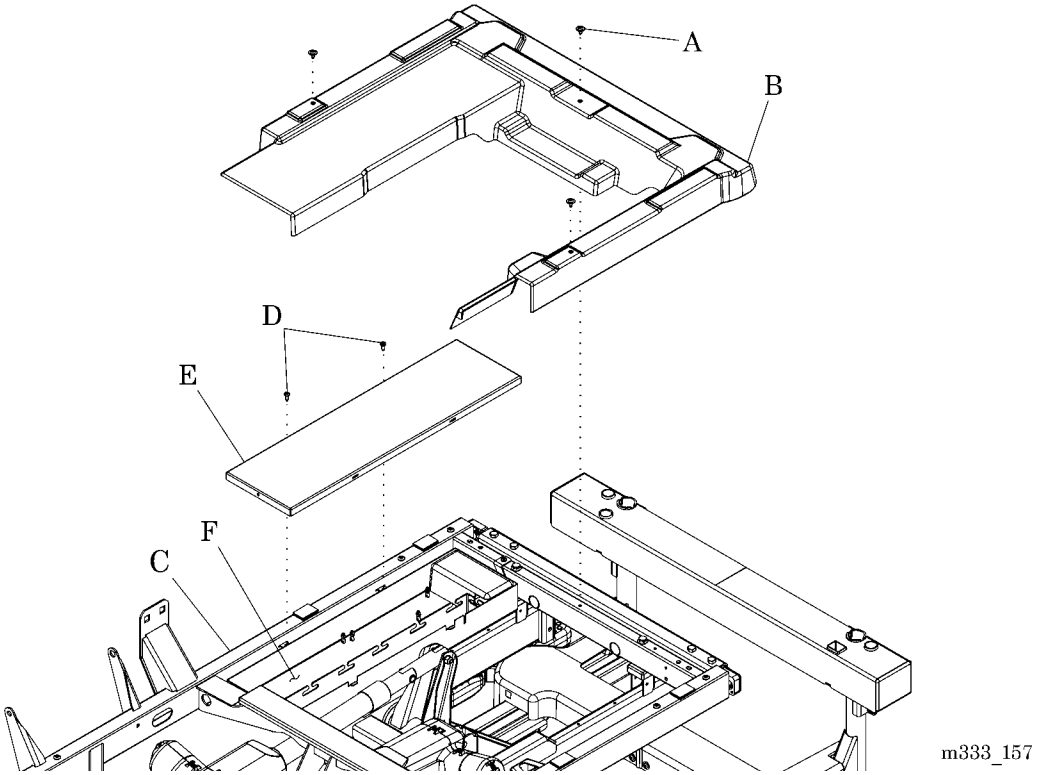
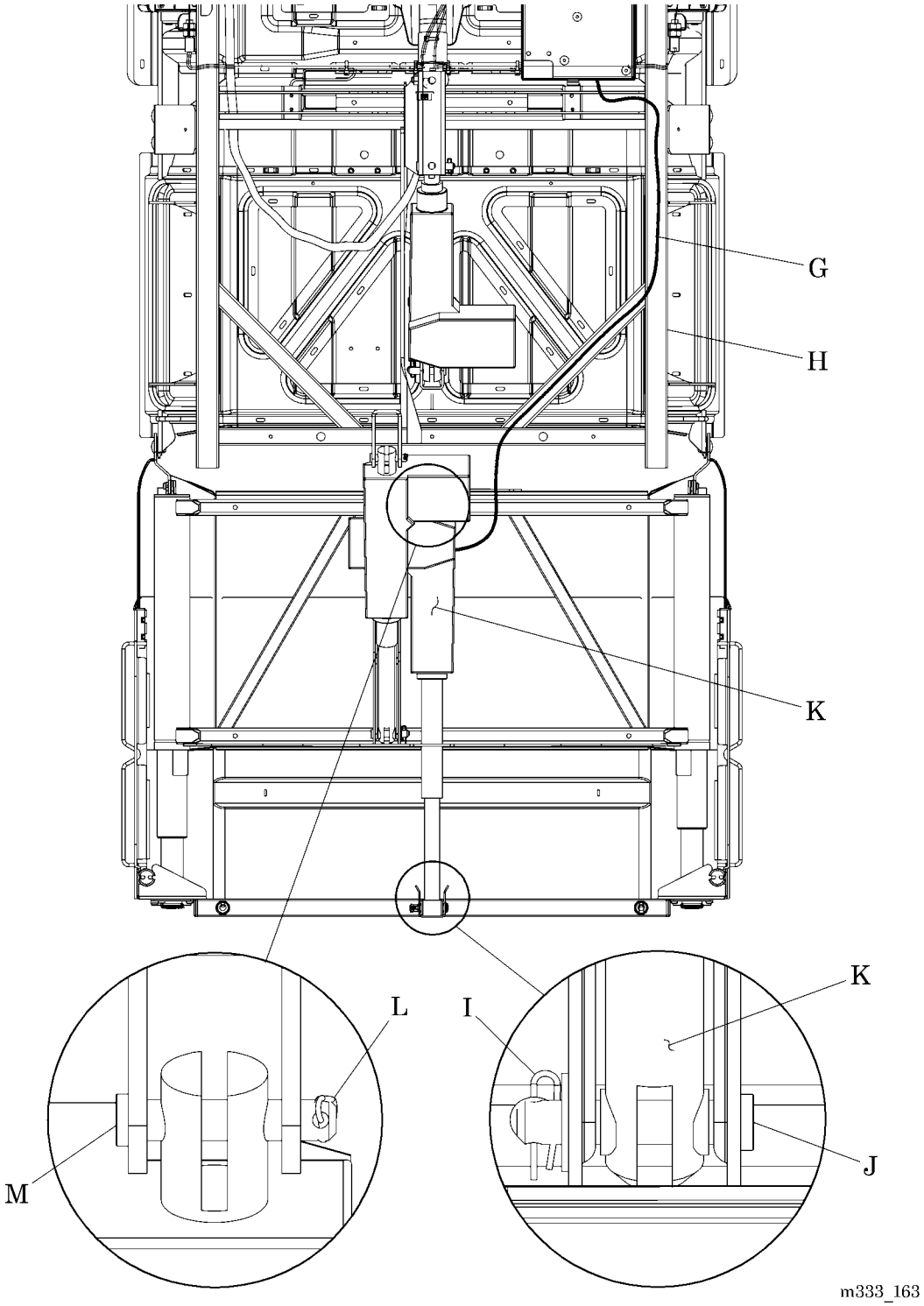
Figure 4-33. Cover Removal



13. While supporting the motor (K), remove the foot end pin (J).
14. While supporting the motor (K), remove the head end pin (M).
15. Remove the motor (K) from the bed.

Figure 4-34. Motor Removal



Replacement

1. Do the removal procedure in reverse order.

NOTE:
Connecting the foot extension motor, and then extending or retracting the motor to align the mount pins may be required.

2. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.20 Load Beam

Tools required: T25 Torx®[1] screwdriver
13 mm wrench
Wire cutters
String, 10' (305 cm)

Removal

1. Set the brakes.
2. Raise the bed to the high position.
3. Raise the head section to the highest position.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

4. Unplug the bed from its power source.
5. Remove the screws (A) securing the cover (B) to the bed (C) (see figure 4-35 on page 4-70).
6. Remove the cover (B).
7. Remove the two screws (D) securing the electronics module cover (E) to the electronics module (F).
8. Remove the electronics module cover (E).
9. If installed, remove the cover (G).
10. Disconnect the affected load beam cable from the scale P.C. board.
11. Tie the string to the end of the load beam cable.
12. For the foot end and left head end load beam, do the following:
    a. Remove the screw (H) securing the foot cover (I) to the bed (C).

NOTE:
The foot cover does not need to be removed for the left head end load beam.

    b. Remove the cover (I).

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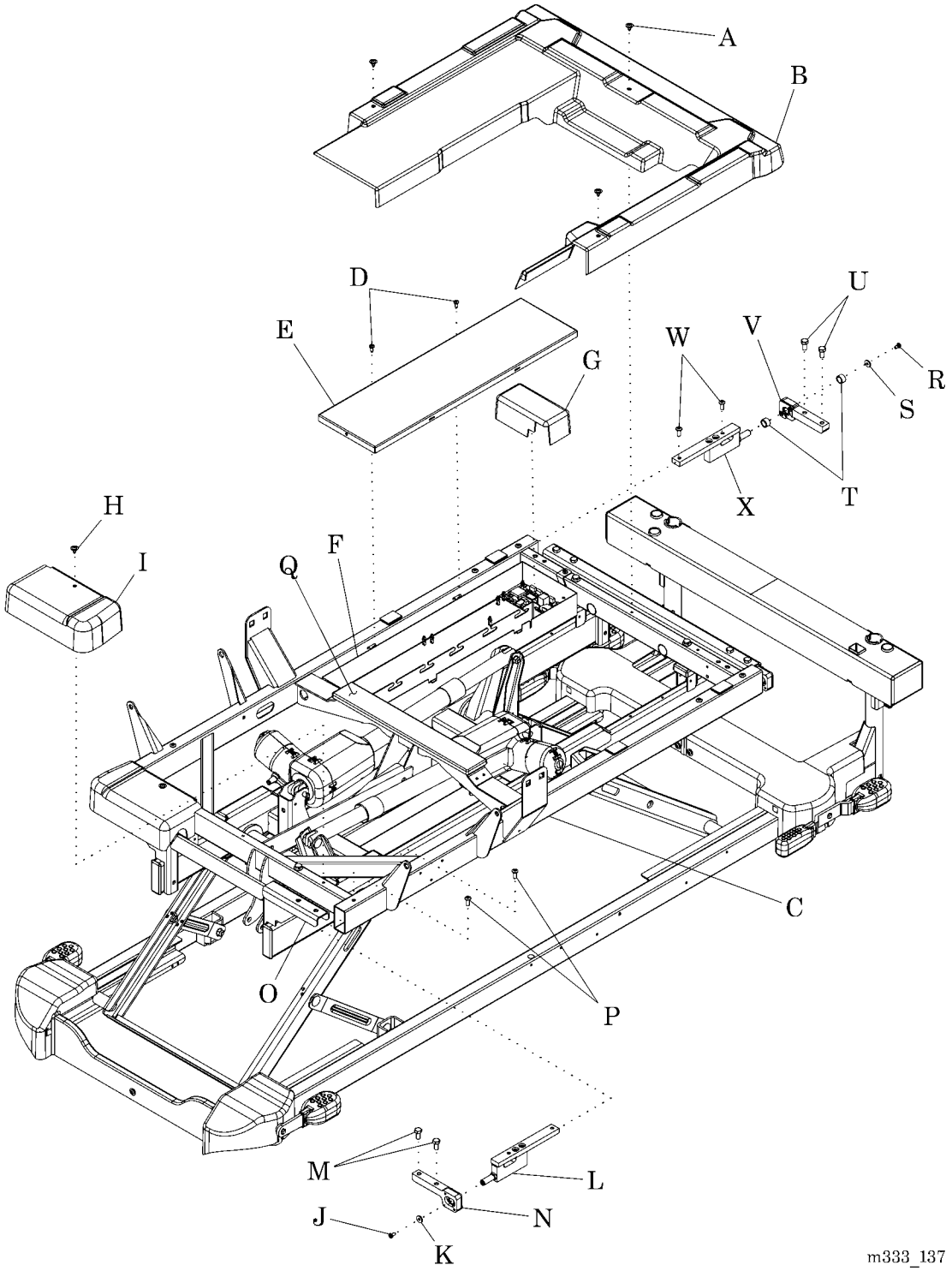
Figure 4-35. Load Beam



c. Remove the screw (J) and washer (K) from the end of the load beam (L).

d. Remove the two bolts (M) securing the block (N) to the intermediate frame (O).

e. Remove the block (N) from the intermediate frame (O).

f. Remove the block (N) from the load beam (L).

g. Remove the two screws (P) securing the load beam (L) to the bed (C).

h. Remove the channel cover (Q).

i. Remove the load beam (L) from the bed (C).

NOTE:
The string will act as a pull string for routing the new load beam cable through the bed during installation.

13. For the right head end load beam, do the following:

a. Remove the screw (R) and washer (S) from the end of the load beam (X).

b. Remove the outer plastic spacer (T) from the load beam (X).

c. Remove the two bolts (U) securing the block (V) to the intermediate frame (O).

d. Remove the block (V) from the intermediate frame (O).

e. Remove the inner plastic spacer (T) from the load beam (X).

f. Remove the two screws (W) securing the load beam (X) to the intermediate frame (O).

g. Remove the load beam from the bed (C).

NOTE:
The string will act as a pull string for routing the new load beam cable through the bed during installation.

Replacement

1. Do the removal procedure in reverse order.

2. Calibrate the scale (see “Scale Calibration” on page 6-12).

3. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.21 Battery

Tools required: T20 Torx®[1] screwdriver
T25 Torx® screwdriver
Wire cutters

Removal

NOTE:
The batteries must be replaced in pairs.

1. Set the brakes.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

2. Unplug the bed from its power source.

NOTE:
If the battery function is active, the bed must be plugged in, then unplugged to deactivate the battery.

3. Remove the six screws (A) securing the power supply module cover (B) to the bed (C) (see figure 4-36 on page 4-73).

4. Remove the cover (B).

5. Make note of the position of the cables on the batteries (D).

6. Remove the cable tie (G) from the wire bundle (H).

7. Disconnect the cables on the batteries (D).

8. Remove the screw (E) securing the bracket (F) to the bed (C).

9. Remove the bracket (F).

WARNING:
If battery fluid touches skin or clothing, immediately wash it off with clean water. If battery fluid c gets in the eyes, immediately flush them with water and consult a physician. Failure to do so could result in personal injury.

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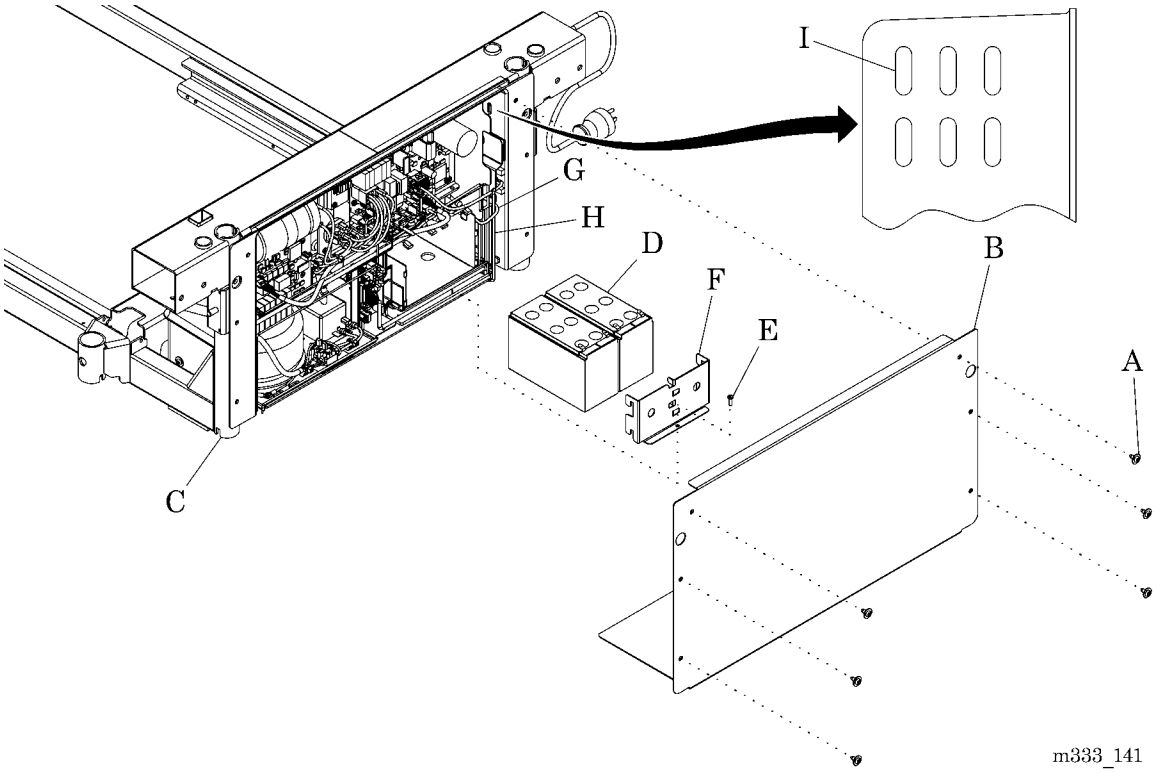
Figure 4-36. Batteries



10. Remove the batteries (D).

11. Dispose of the batteries according to local regulations.

CAUTION:
Make sure the vent holes are clear. Failure to do so could result in overheating and equipment damage.

12. Make sure the vent holes (I) in the power supply module are clear.

Replacement

1. Do the removal procedure in reverse order.

2. To make sure the VersaCare™ Bed operates correctly, do the "Function Checks" on page 2-6.

4.22 AC Power Fuses

Tools required: T25 Torx®[1] Screwdriver

Removal

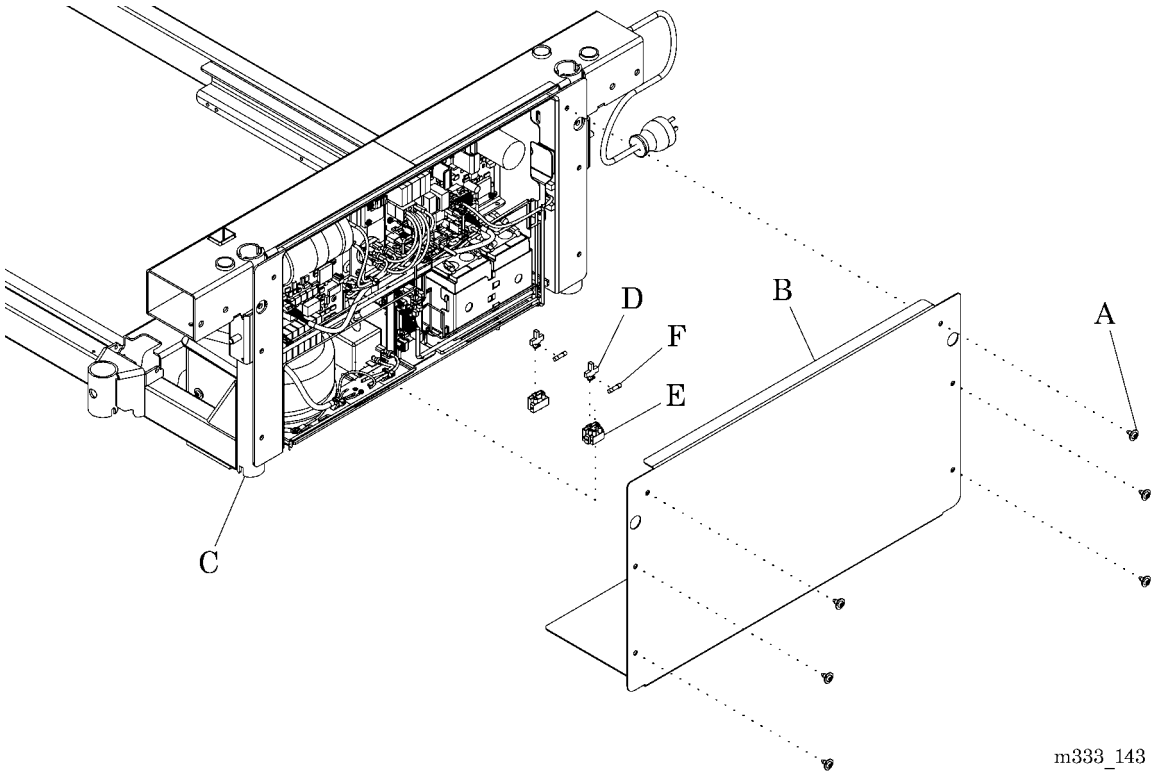
1. Set the brakes.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

2. Unplug the bed from its power source.

3. Remove the six screws (A) securing the power supply module cover (B) to the bed (C) (see figure 4-37 on page 4-74).

Figure 4-37. AC Power Fuse



4. Remove the cover (B).

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5. Remove the fuse holder (D) from the fuse block (E).
6. Remove the fuse (F) from the fuse holder (D).

Replacement

1. Do the removal procedure in reverse order.
2. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.23 Transformer and Battery Fuse

Tools required: T25 Torx®[1] screwdriver

Removal

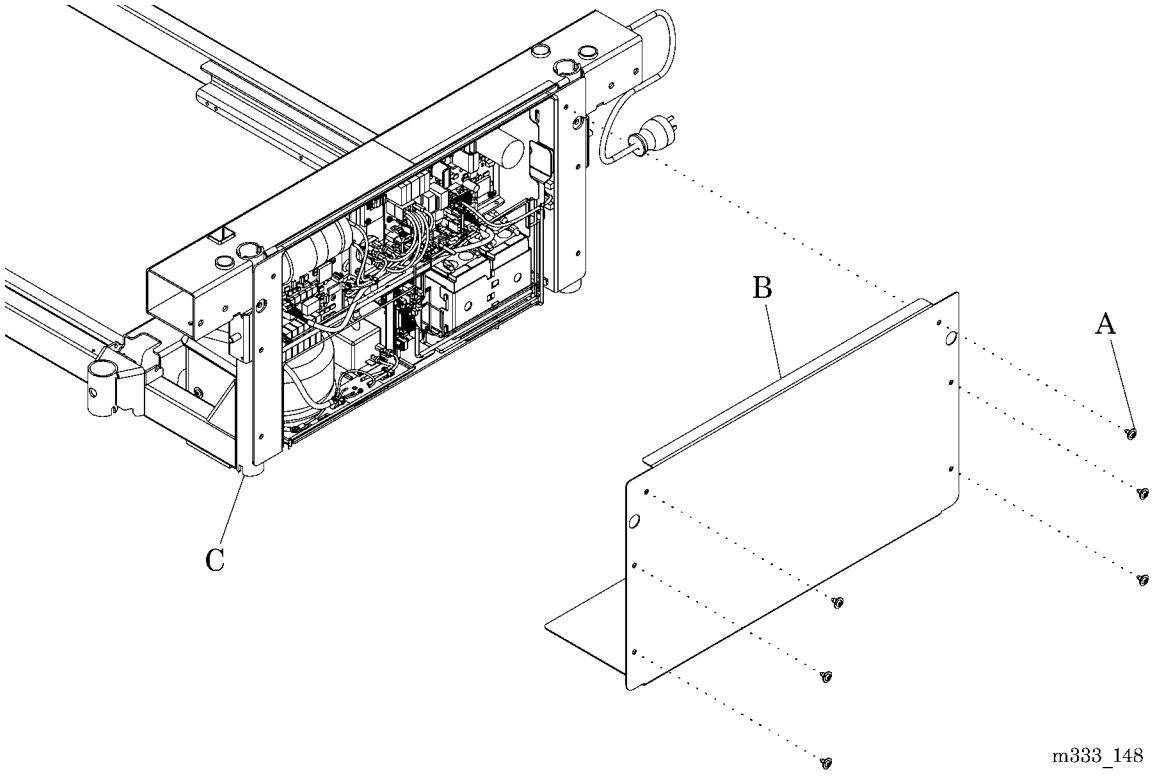
1. Set the brakes.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

2. Unplug the bed from its power source.

3. Remove the six screws (A) securing the power supply module cover (B) to the bed (C) (see figure 4-38 on page 4-76).

Figure 4-38. Cover Removal



4. Remove the cover (B).

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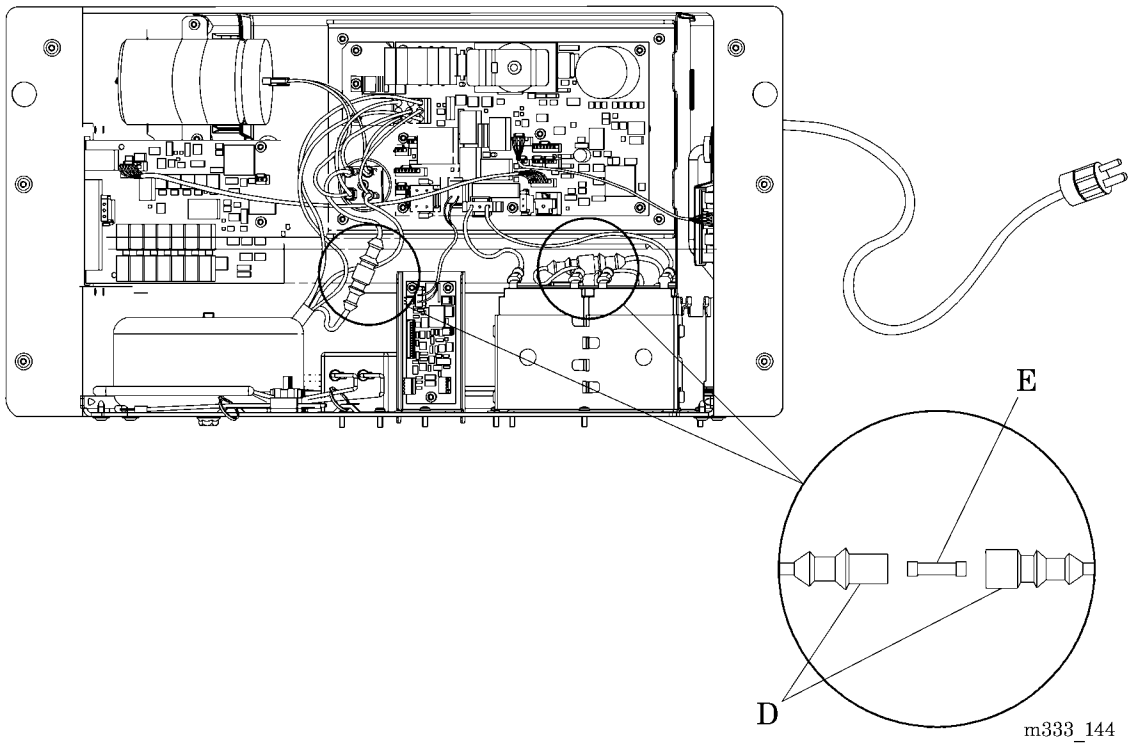
5. Locate the appropriate fuse holder (D) (see figure 4-39 on page 4-77).

Figure 4-39. Fuse Holder



6. Separate the two halves of the holder (D).

7. Remove the fuse (E) from the holder (D).

Replacement

1. Do the removal procedure in reverse order.

2. To make sure the VersaCare™ Bed operates correctly, do the "Function Checks" on page 2-6.

4.24 Power Cord

Tools required: T25 Torx®[1] screwdriver
17 mm wrench
Wire cutters

Removal

1. Set the brakes.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

2. Unplug the bed from its power source.

3. Remove the six screws (A) securing the power supply cover (B) to the bed (C) (see figure 4-40 on page 4-79).

4. Remove the batteries (refer to procedure 4.21).

5. Remove the jam nut (D) from the strain relief (E).

NOTE:
The jam nut can only be removed from the power cord after the power cord is disconnected from the fuse blocks.

6. Disconnect the power cord (H) from the fuse blocks (G) by loosening the screws in the fuse blocks (G).

7. Cut and remove the cable tie (F) securing the power cord wires to the bed.

8. Remove the power cord (H) and strain relief (E) from the bed (C).

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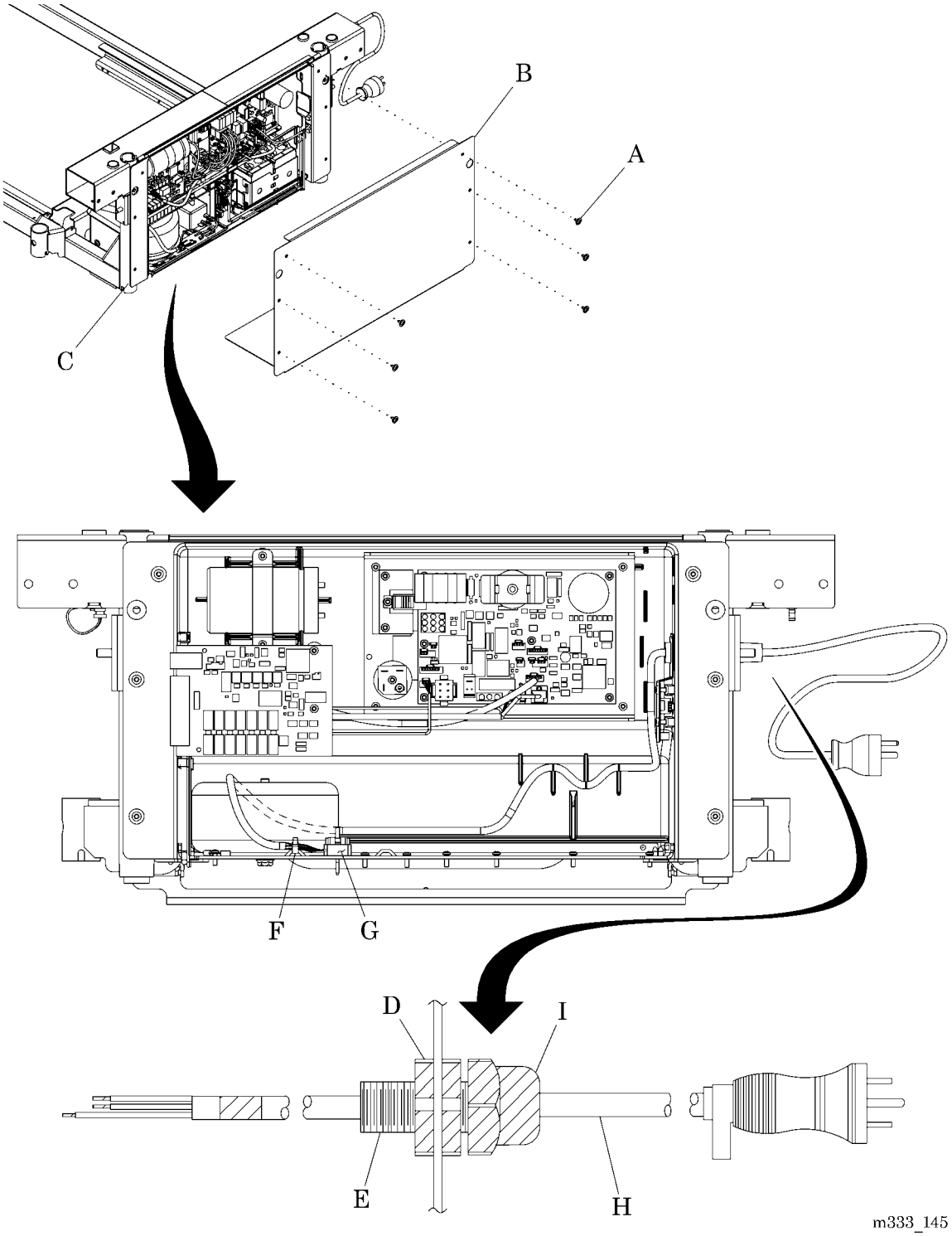
Figure 4-40. Power Cord



Replacement

1. Do the removal procedure in reverse order.
2. Make sure the nut (I) is tight.
3. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.25 Power Supply P.C. Board

Tools required: T25 Torx®[1] screwdriver

Removal

1. Set the brakes.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

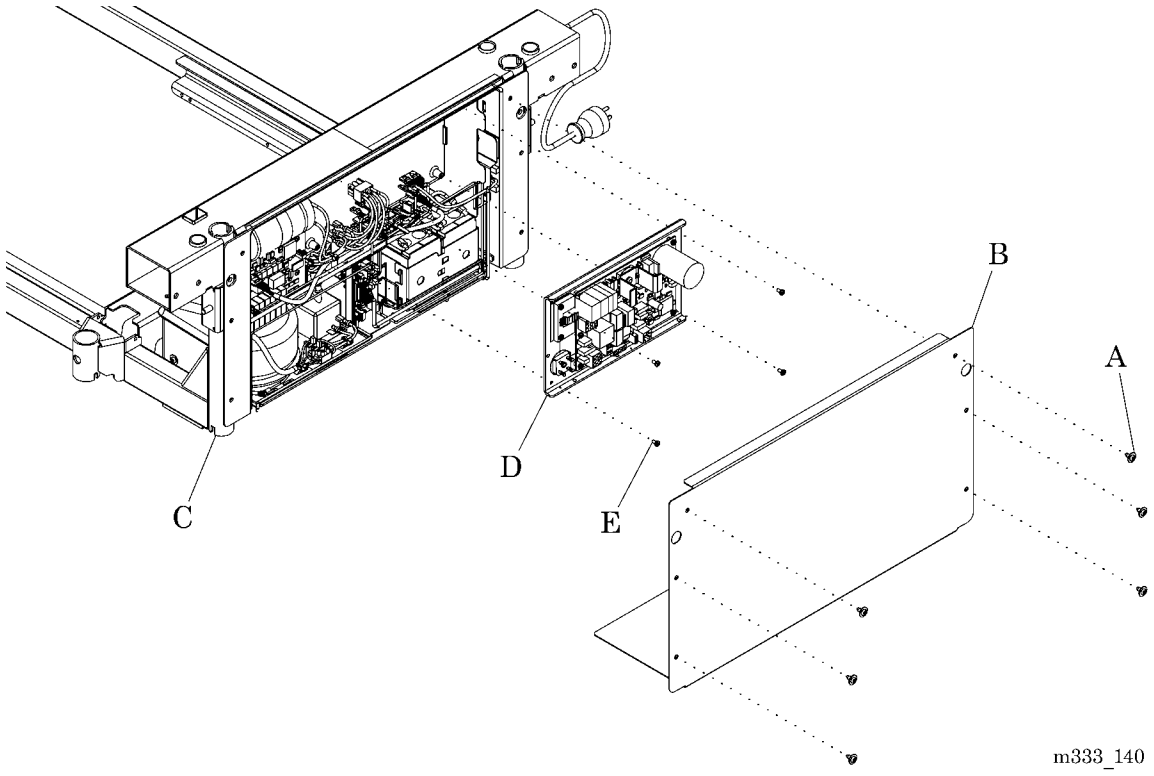
2. Unplug the bed from its power source.

3. Remove the six screws (A) securing the power supply cover (B) to the bed (C) (see figure 4-41 on page 4-81).

4. Remove the power supply cover (B).

5. Disconnect the cables on the power supply P.C. board (D).

Figure 4-41. Power Supply P.C. Board



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6. Remove the four screws (E) securing the power supply P.C. board (D) to the bed (C).

7. Remove the power supply P.C. board (D) from the bed (C).

Replacement

1. Do the removal procedure in reverse order.

2. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.26 SideCom® Communication System P.C. Board

Tools required: T25 Torx®[1] screwdriver
1/4" nut driver

Removal

1. Set the brakes.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

2. Unplug the bed from its power source.
3. Remove the six screws (A) securing the power supply cover (B) to the bed (C) (see figure 4-42 on page 4-84).
4. Remove the power supply cover (B).
5. Disconnect all cables from the SideCom® Communication System P.C. board (D).
6. Remove the two screws (E) securing the connector cover (F) to the P.C. board (D).
7. Remove the two screws (G) securing the P.C. board (D) to the bed (C).

4

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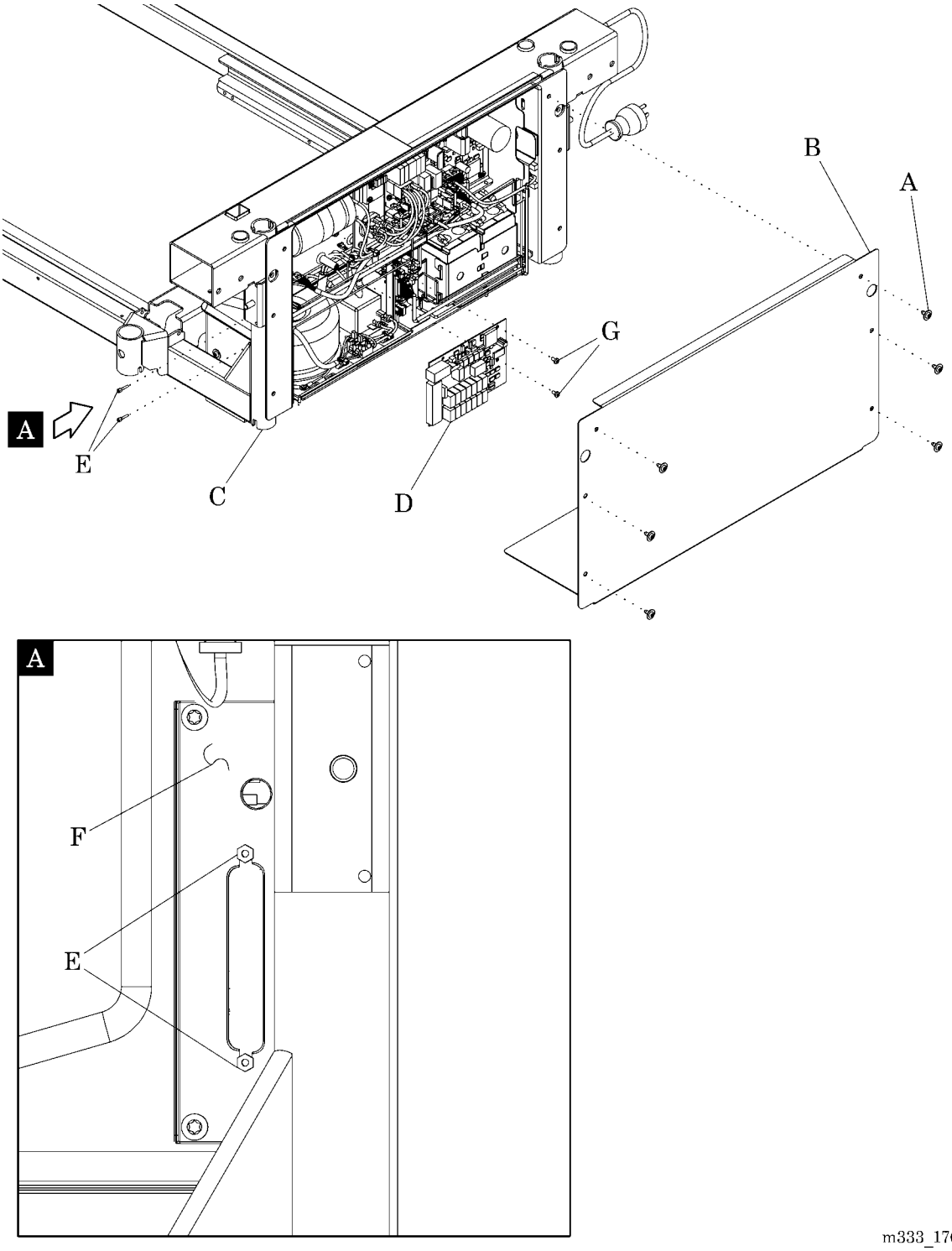
Figure 4-42. SideCom® Communication System P.C. Board



Replacement

1. Do the removal procedure in reverse order.
2. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.27 Sensor Strip

Tools required: Rubber hammer
3/32" punch
T25 Torx®[1] screwdriver
Wire cutters
Rivet gun with plastic rivets

Removal

1. Set the brakes.
2. Raise the bed to the high position.
3. Raise the head section to its highest position.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

4. Unplug the bed from its power source.
5. For two short sensor strips and the middle sensor strip on the head section, do the following:
   a. Remove the screws (A) securing the cover (B) to the bed (C) (see figure 4-43 on page 4-87).
   b. Remove the cover (B).
   c. Remove the two screws (D) securing the electronics module cover (E) to the electronics module (F).
   d. Remove the electronics module cover (E).
   e. If installed, remove the shield (G).
   f. Disconnect the sensor strip cable from the scale P.C. board.
   g. Using the punch and hammer, punch out the center of the four rivets (I) securing the sensor strip (H) to the bed (see figure 4-44 on page 4-87).
   h. Remove the sensor strip (H) from the sleep deck (J).

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Figure 4-43. Cover Removal

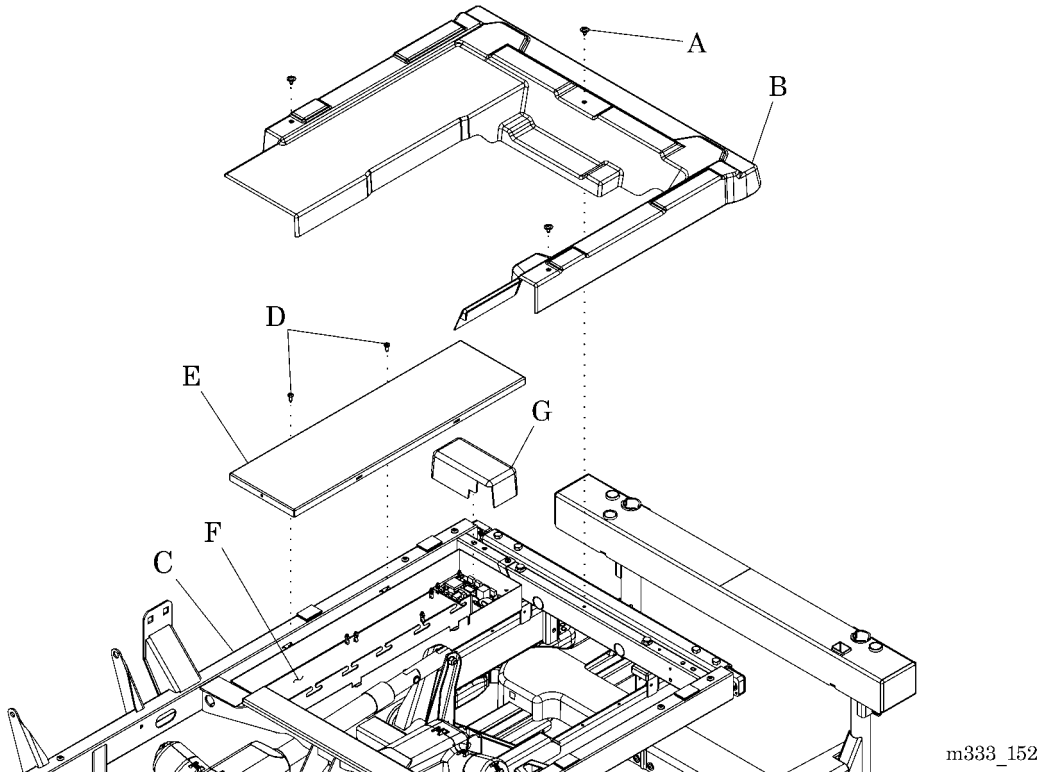
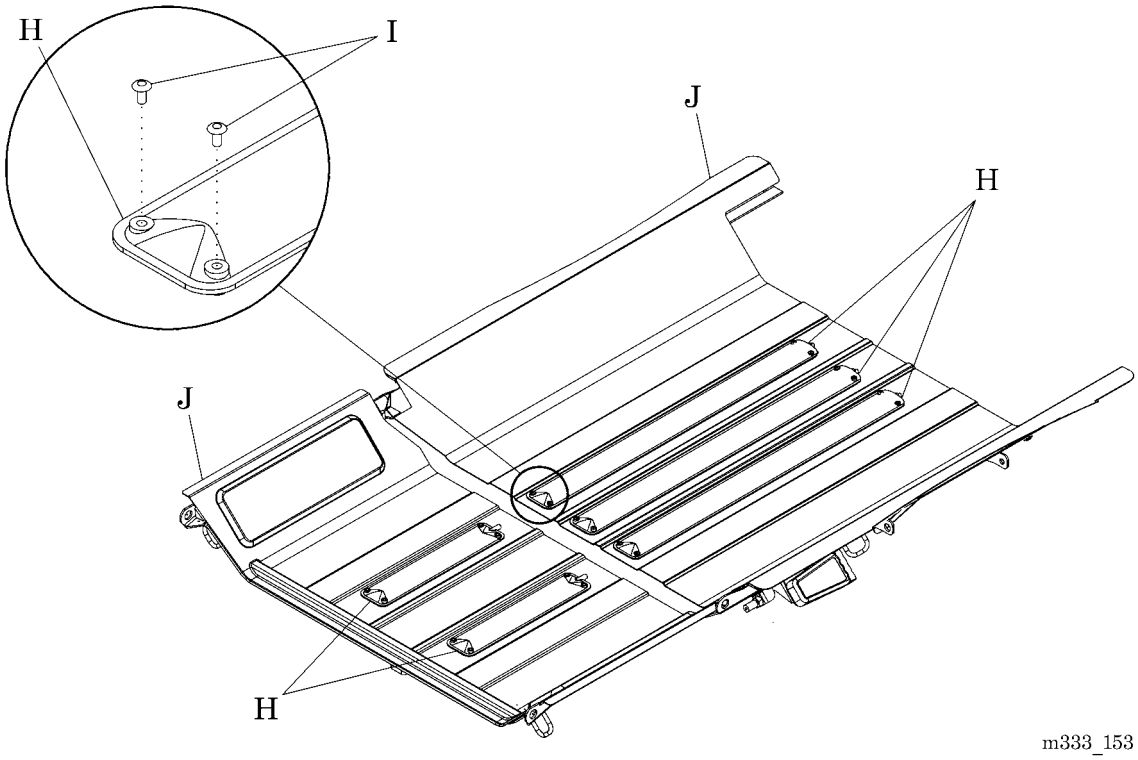
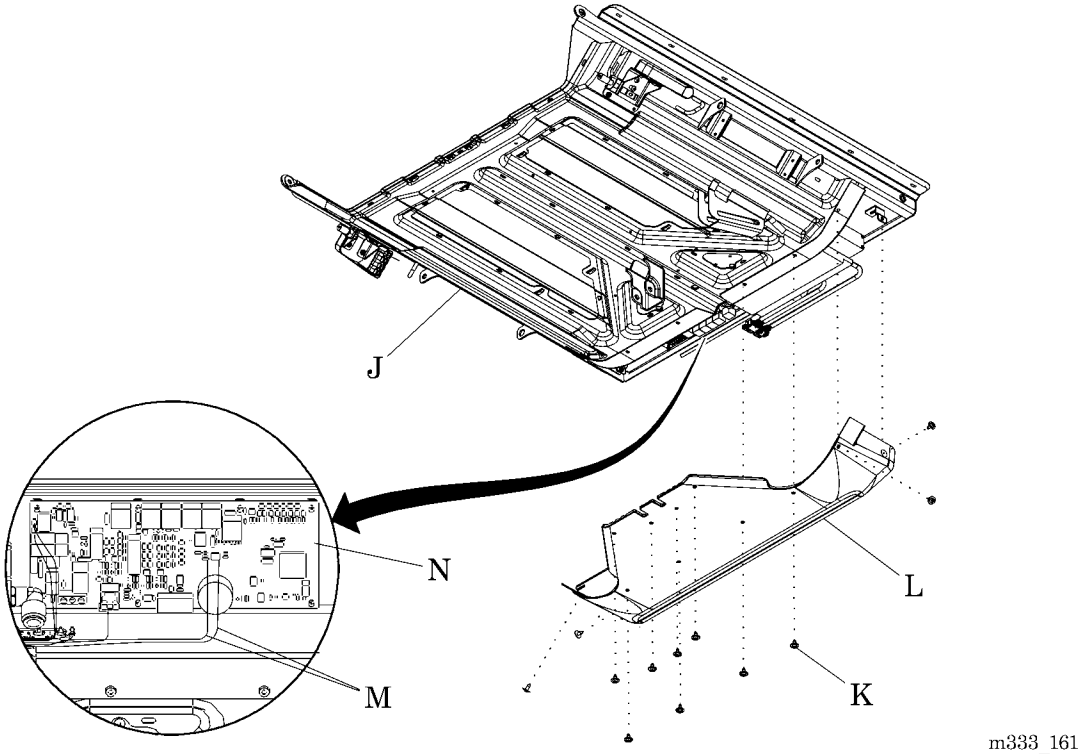


Figure 4-44. Sensor Strip



6. For the two outer sensor strips (H) on the head section, do the following:
   a. Remove the 11 screws (K) securing the air module cover (L) to the sleep deck (J) (see figure 4-45 on page 4-88).

Figure 4-45. Air Module Sensor Strip



   b. Remove the air module cover (L).
   c. Disconnect the sensor cable (M) from the air control P.C. board (N).
   d. Using the punch and hammer, punch out the center of the four rivets (I) securing the sensor strip (H) to the sleep deck (J) (see figure 4-44 on page 4-87).
   e. Remove the sensor strip (H) from the sleep deck (J).

Replacement

1. Do the removal procedure in reverse order.
2. To make sure the VersaCare™ Bed operates correctly, do the "Function Checks" on page 2-6.

4.28 Obstacle Detect

Tools required: T25Torx®[1] screwdriver
Small screwdriver

Removal

1. Set the brakes.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

2. Unplug the bed from its power source.
3. For the head end detectors, do the following:
   a. Remove the screw (A) and fastener (L) securing the head end cover (B) to the bed (C) (see figure 4-46 on page 4-90).
   b. Remove the head end cover (B).
   c. Using the small screwdriver under the snaps, carefully remove the obstacle detect cover (D).
   d. For new model obstacle detect covers, remove the screw (M) from the obstacle detect cover (D).
   e. Remove the P.C. board (E) from the cover (D).
   f. Disconnect the cable (F) from the P.C. board (E).
4. For the foot end detectors, do the following:
   a. Remove the screw (G) and fastener (L) securing the foot end cover (H) to the bed (C) (see figure 4-47 on page 4-91).
   b. Remove the foot end cover (H).
   c. Using the small screwdriver under the snaps, carefully remove the obstacle detect cover (I).
   d. For new model obstacle detect covers, remove the screw (N) from the obstacle detect cover (I).
   e. Remove the P.C. board (J) from the cover (I).
   f. Disconnect the cable (K) from the P.C. board (J).

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Figure 4-46. Head End Obstacle Detect

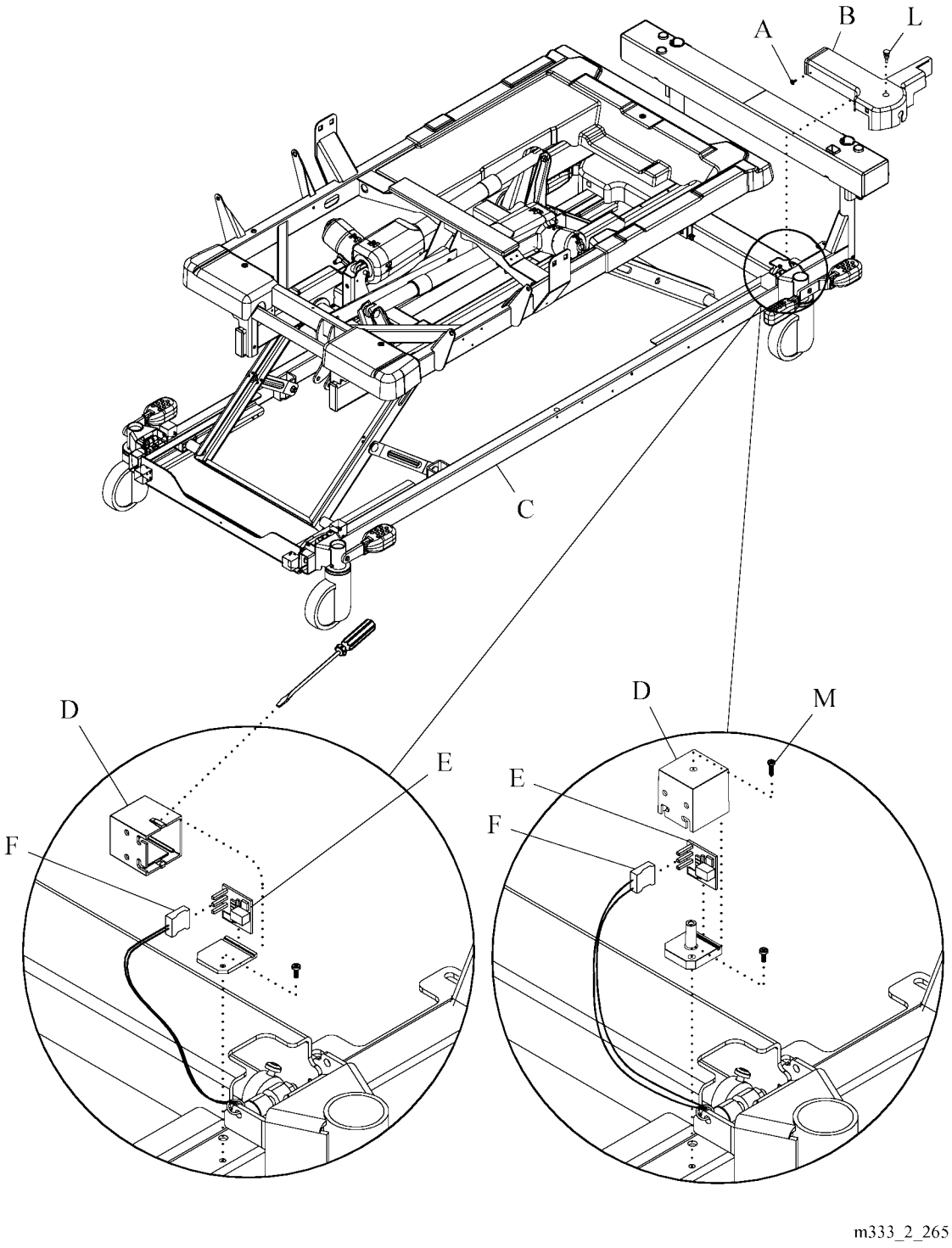
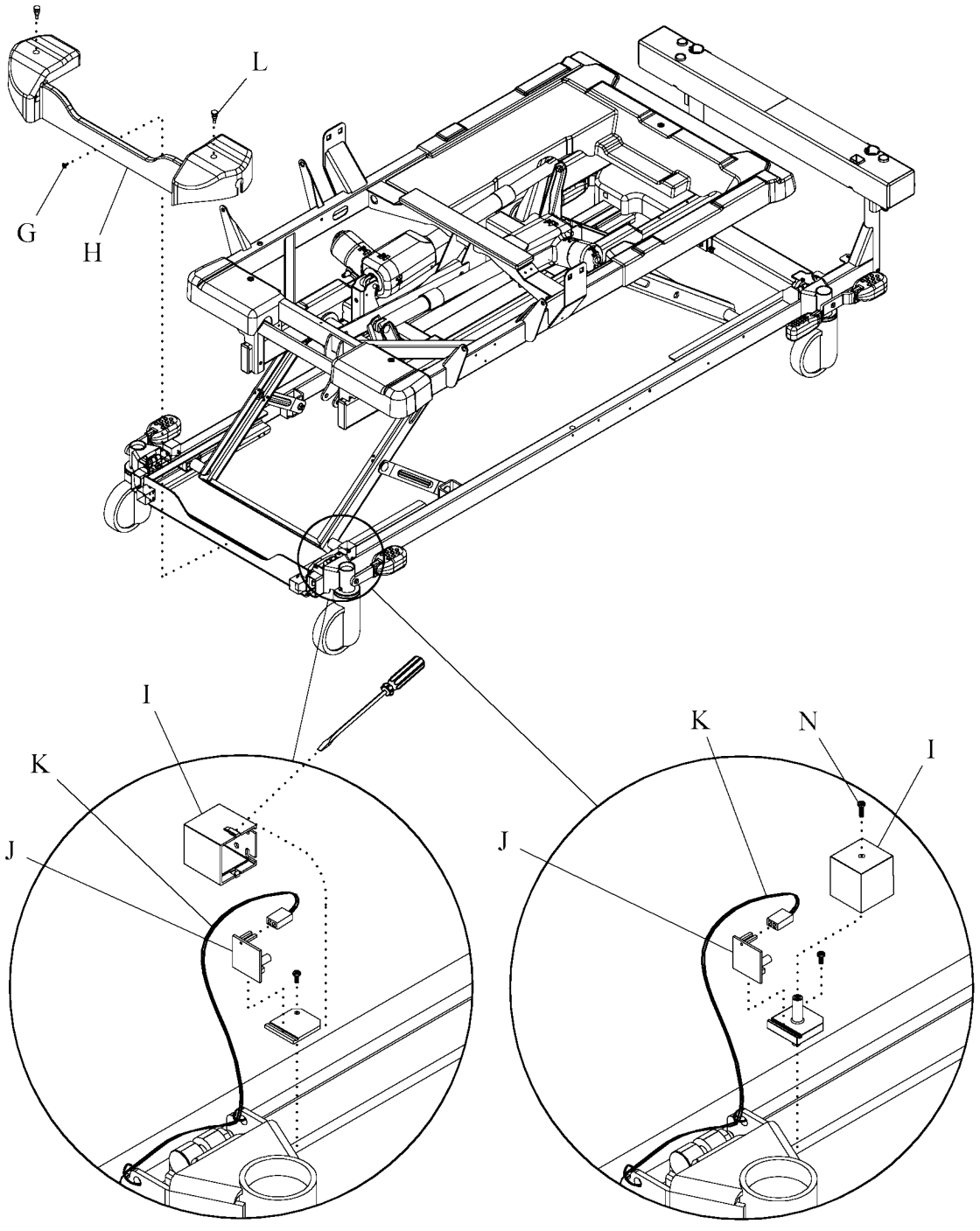


Figure 4-47. Foot End Obstacle Detect



Replacement

1. Do the removal procedure in reverse order.

NOTE:
For the detectors and emitters mounted on the side of the bed, the cable connector goes to the inside of the bed frame.

NOTE:
For the detectors and emitters mounted across the foot end of the bed, the cable connector goes down.

2. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.29 Logic Control P.C. Board

Tools required: T25 Torx®[1] screwdriver
Needle nose pliers
Antistatic strap

Removal

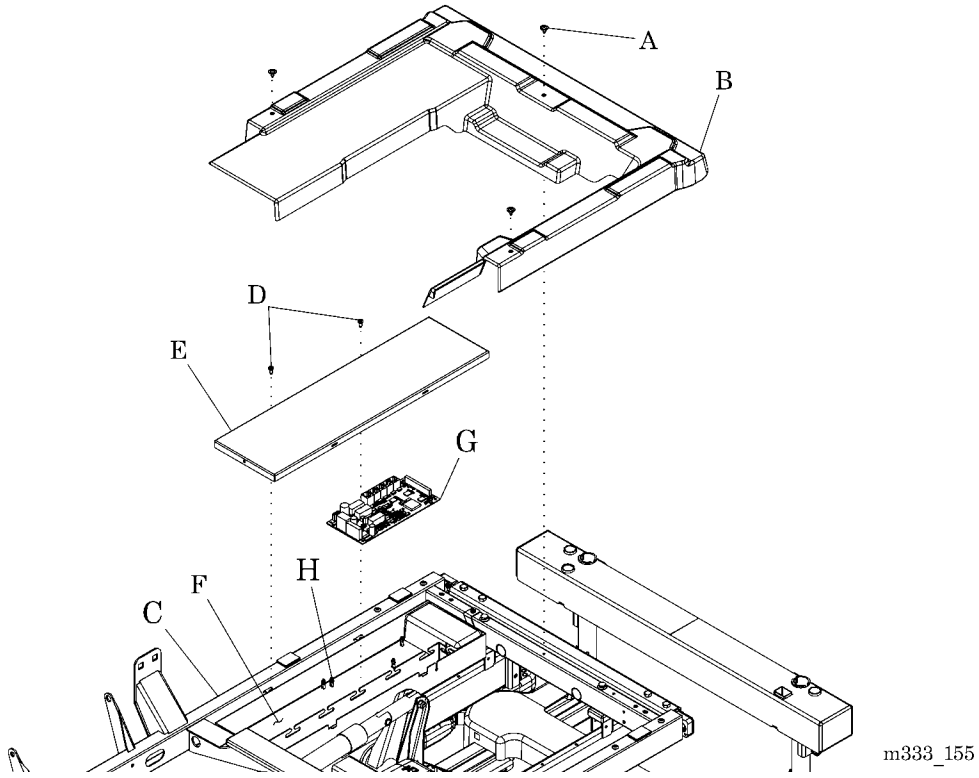
1. Set the brakes.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

2. Unplug the bed from its power source.

3. Remove the screws (A) securing the cover (B) to the bed (C) (see figure 4-48 on page 4-93).

Figure 4-48. Logic Control P.C. Board



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4. Remove the cover (B).
5. Remove the two screws (D) securing the electronics module cover (E) to the electronics module (F).
6. Remove the electronics module cover (E).
7. Disconnect the cables on the logic control P.C. board (G).
8. Using the needle nose pliers, pinch the ends of the stand-offs (H) securing the P.C. board (G) to the electronics module (F).
9. Remove the P.C. board (G).

Replacement

CAUTION:
When handling electronic components, wear an antistatic strap. Failure to do so could result in component damage.

1. Put on the antistatic strap.
2. Do the removal procedure in reverse order.
3. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.30 Motor Control P.C. Board

Tools required: T25 Torx®[1] screwdriver
Needle nose pliers
Antistatic strap

Removal

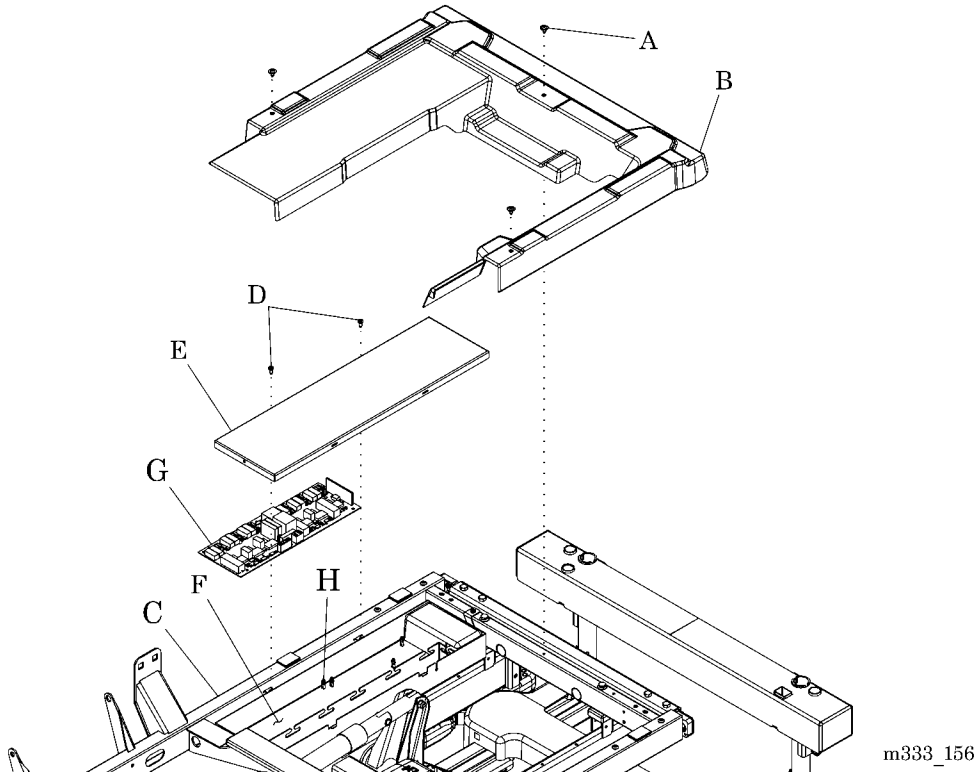
1. Set the brakes.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

2. Unplug the bed from its power source.

3. Remove the screws (A) securing the cover (B) to the bed (C) (see figure 4-49 on page 4-95)

Figure 4-49. Motor Control P.C. Board



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4. Remove the cover (B).

5. Remove the two screws (D) securing the electronics module cover (E) to the electronics module (F).

6. Remove the electronics module cover (E).

7. Disconnect the cables on the motor control P.C. board (G).

8. Using the needle nose pliers, pinch the ends of the stand-offs (H) securing the P.C. board (G) to the electronics module (F).

9. Remove the P.C. board (G).

Replacement

CAUTION:
When handling electronic components, wear an antistatic strap. Failure to do so could result in component damage.

1. Put on the antistatic strap.

2. Do the removal procedure in reverse order.

3. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.31 Scale System P.C. Board

Tools required: T25 Torx®[1] screwdriver
Needle nose pliers
Antistatic strap

Removal

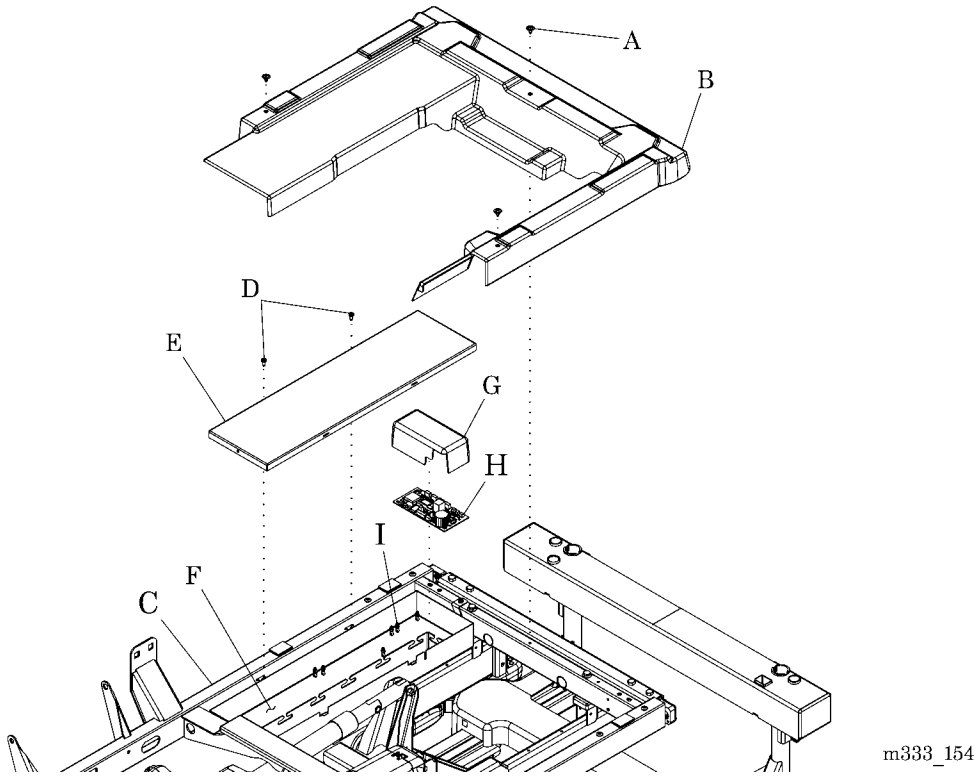
1. Set the brakes.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

2. Unplug the bed from its power source.

3. Remove the screws (A) securing the cover (B) to the bed (C) (see figure 4-50 on page 4-97)

Figure 4-50. Scale P.C. Board



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4. Remove the cover (B).
5. Remove the two screws (D) securing the electronics module cover (E) to the electronics module (F).
6. Remove the electronics module cover (E).
7. Remove the scale P.C. board cover (G).
8. Disconnect the cables on the scale P.C. board (H).
9. Using the needle nose pliers, pinch the ends of the stand-offs (I) securing the P.C. board (H) to the electronics module (F).
10. Remove the P.C. board (H).

Replacement

CAUTION:
When handling electronic components, wear an antistatic strap. Failure to do so could result in component damage.

1. Put on the antistatic strap.
2. Do the removal procedure in reverse order.

NOTE:
Connector P1 is left-head, P2 is left-foot, P3 is foot-right, and P4 is head-right.

3. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.32 IntelliDrive® Transport System Interface P.C. Board

Tools required: T25 Torx®[1] screwdriver

Removal

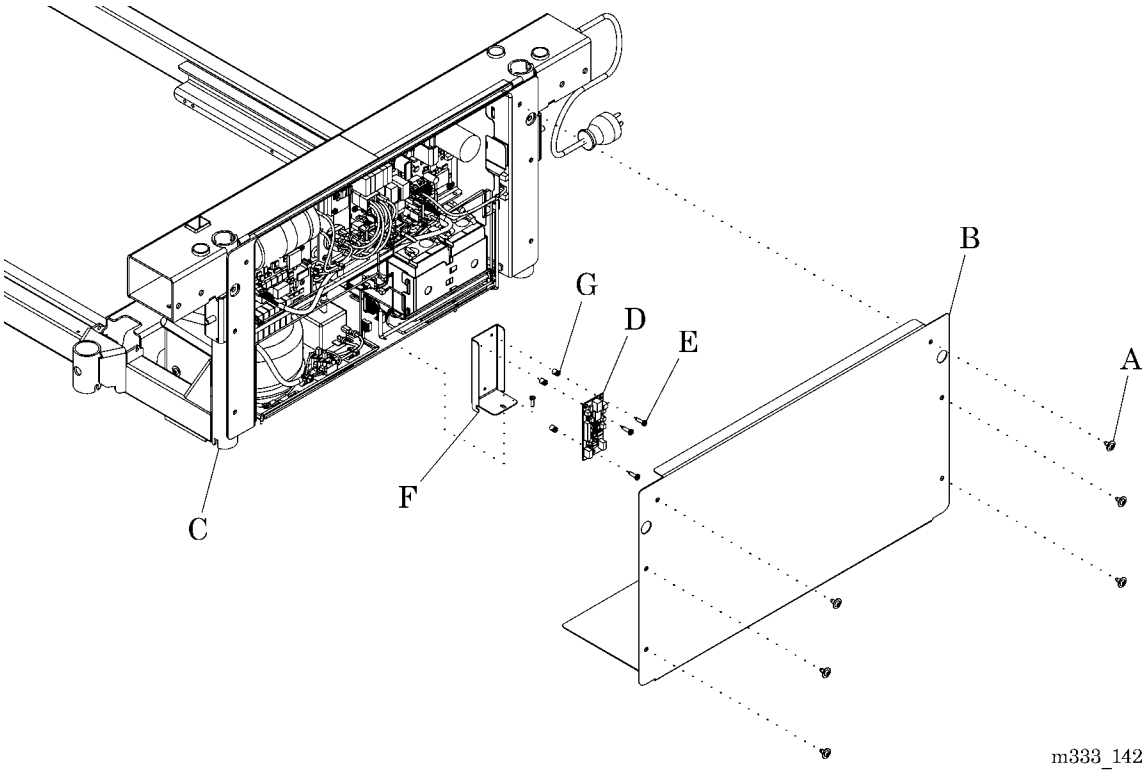
1. Set the brakes.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

2. Unplug the bed from its power source.

3. Remove the six screws (A) securing the power supply cover (B) to the bed (C) (see figure 4-51 on page 4-99).

Figure 4-51. Interface P.C. Board



4. Remove the power supply cover (B).

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5. Disconnect all the cables on the interface P.C. board (D).
6. Remove the three screws (E) securing the interface P.C. board (D) to the mount bracket (F).
7. Remove the interface P.C. board (D) and spacers (G).

Replacement

CAUTION:
When handling electronic components, wear an antistatic strap. Failure to do so could result in component damage.

1. Put on the antistatic strap.
2. Do the removal procedure in reverse order.
3. To make sure the VersaCare™ Bed operates correctly, do the "Function Checks" on page 2-6.

4.33 Battery—IntelliDrive® Transport System

Tools required: T25 Torx®[1] head screwdriver
1/4" box end wrench

Removal

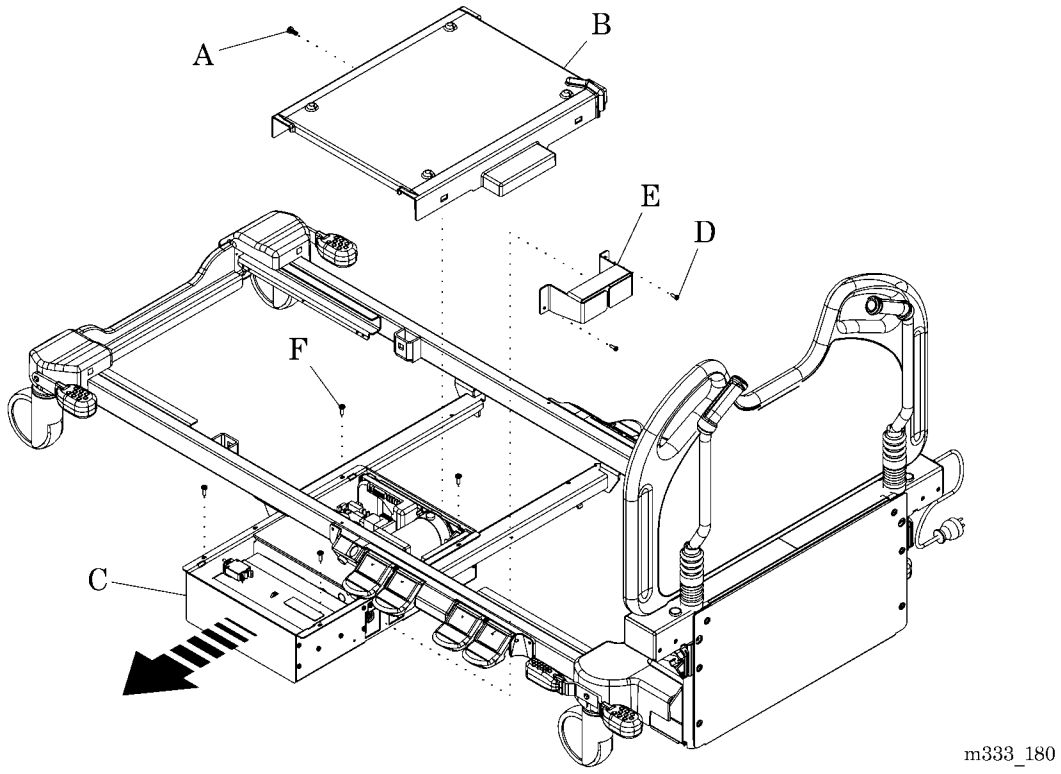
1. Set the brakes.

WARNING:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

2. Unplug the bed from its power source.

3. Remove the screw (A) securing the cover (B) to the drive box (C) (see figure 4-52 on page 4-101).

Figure 4-52. Cover Removal



4. Remove the cover (B).

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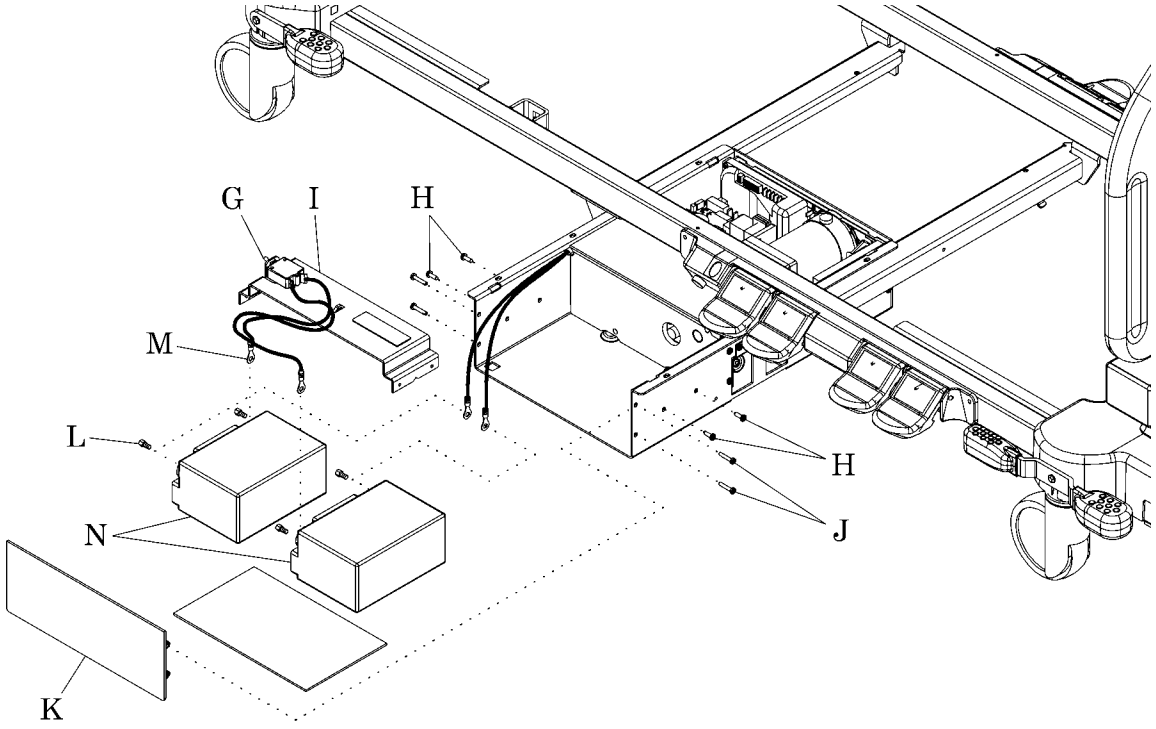
5. Disconnect the cable inside the cover (B) from the PACM board.
6. Remove the two screws (D) securing the shroud (E) to the drive box (C).
7. Remove the shroud (E).
8. Remove the four screws (F) securing the drive box (C) to the bed.
9. Slide the drive box (C) to the patient's left side of the bed.

WARNING:
Turn the circuit breaker to the **Off** position. Failure to do so could result in personal injury or equipment damage.

10. Turn the circuit breaker (G) to the **off** position (see figure 4-53 on page 4-102).

Figure 4-53. Battery Removal—IntelliDrive® Transport System



11. Remove the four screws (H) securing the retaining bracket (I) to the drive box.

12. Remove the retaining bracket (I).

13. Remove the four screws (J) securing the end plate (K) to the drive box.

14. Remove the end plate (K).

15. Remove the screws (L) securing the cables (M) to the batteries (N).

WARNING:
If battery fluid touches skin or clothing, immediately wash it off with clean water. If battery fluid c gets in the eyes, immediately flush them with water and consult a physician. Failure to do so could result in personal injury.

16. Remove the batteries (N) from the drive box.

17. Dispose of the batteries according to local regulations.

Replacement

1. Do the removal procedure in reverse order.

WARNING:
Ensure the black wire on the battery is connected to the negative terminal on the battery and the red wire is connected to the positive terminal on the battery. Failure to do can result in personal injury or equipment damage.

2. Connect the black wire to the negative terminal and the red wire to the positive terminal on the battery.

3. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.34 PACM Board—IntelliDrive® Transport System

Tools required: T25 Torx®[1] screwdriver

Removal

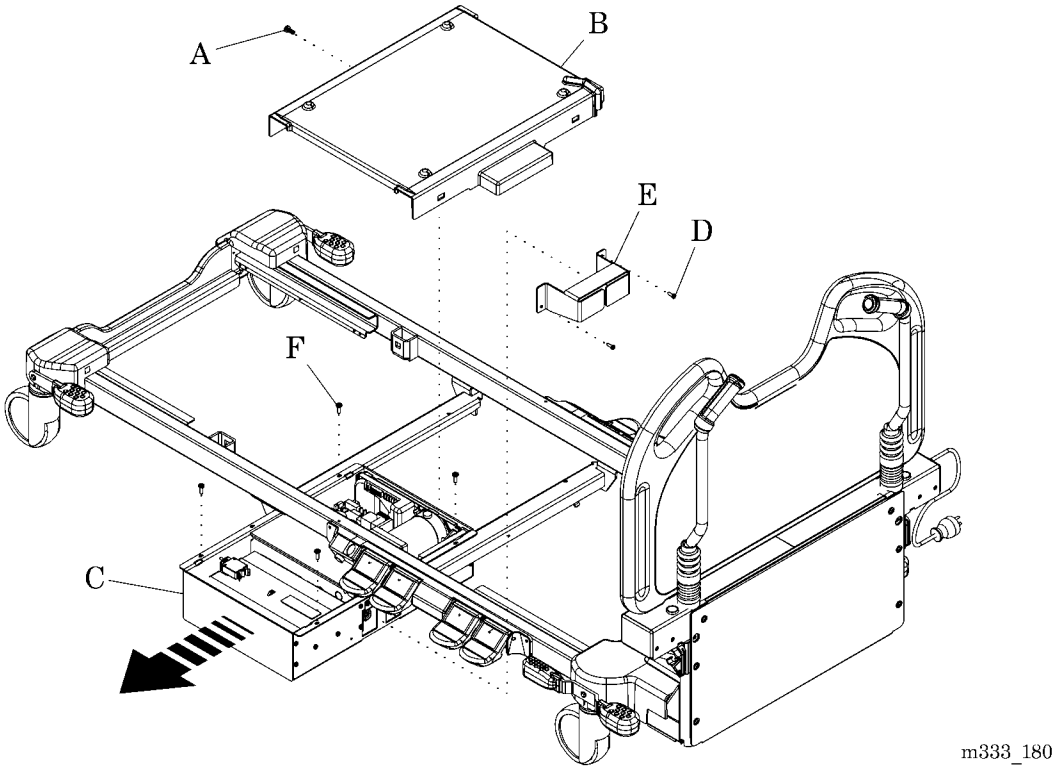
1. Set the brakes.

WARNING:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

2. Unplug the bed from its power source.

3. Remove the screw (A) securing the cover (B) to the drive box (C) (see figure 4-54 on page 4-104).

Figure 4-54. Cover Removal



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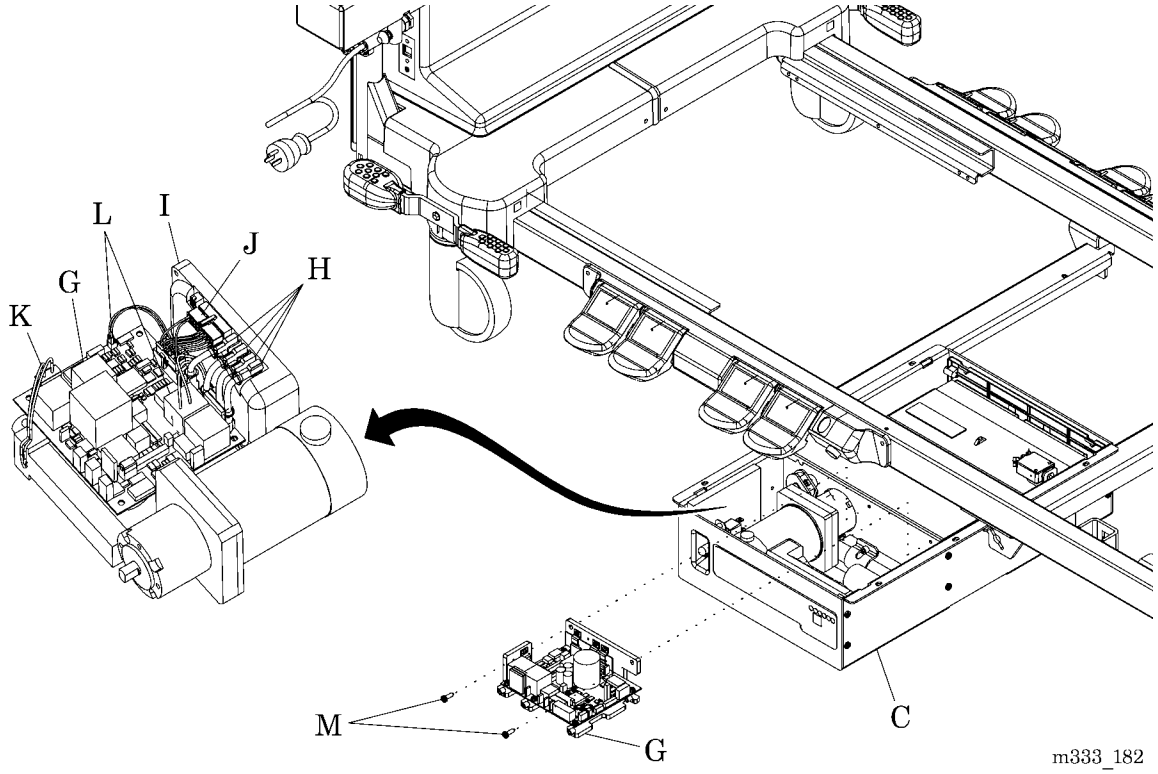
4. Remove the cover (B).
5. Disconnect the cable inside the cover (B) from the PACM board.
6. Remove the two screws (D) securing the shroud (E) to the drive box (C).
7. Remove the shroud (E).
8. Remove the four screws (F) securing the drive box (C) to the bed.
9. Slide the drive box (F) to the patient's right side of the bed.
10. Disconnect the four wires (H) connecting the PACM board (G) to the motor controller (I) (see figure 4-55 on page 4-105).

Figure 4-55. PACM Board Removal



11. Disconnect the motor controller harness (J) from the PACM board (G).
12. Disconnect the linear actuator cable (K) from the PACM board (G).
13. Disconnect the two drive motor cables (L) from the PACM board (G).

14. Remove the two screws (M) securing the PACM board (G) to the drive box (C).

15. Remove the PACM board (G) from the drive box (C).

Replacement

1. Do the removal procedure in reverse order.

2. To make sure the VersaCare™ Bed operates correctly, do the "Function Checks" on page 2-6.

4.35 Drive Motor—IntelliDrive® Transport System

Tools required: T25 Torx®[1] screwdriver
#2 phillips head screwdriver
7/16" deep well socket
Ratchet

Removal

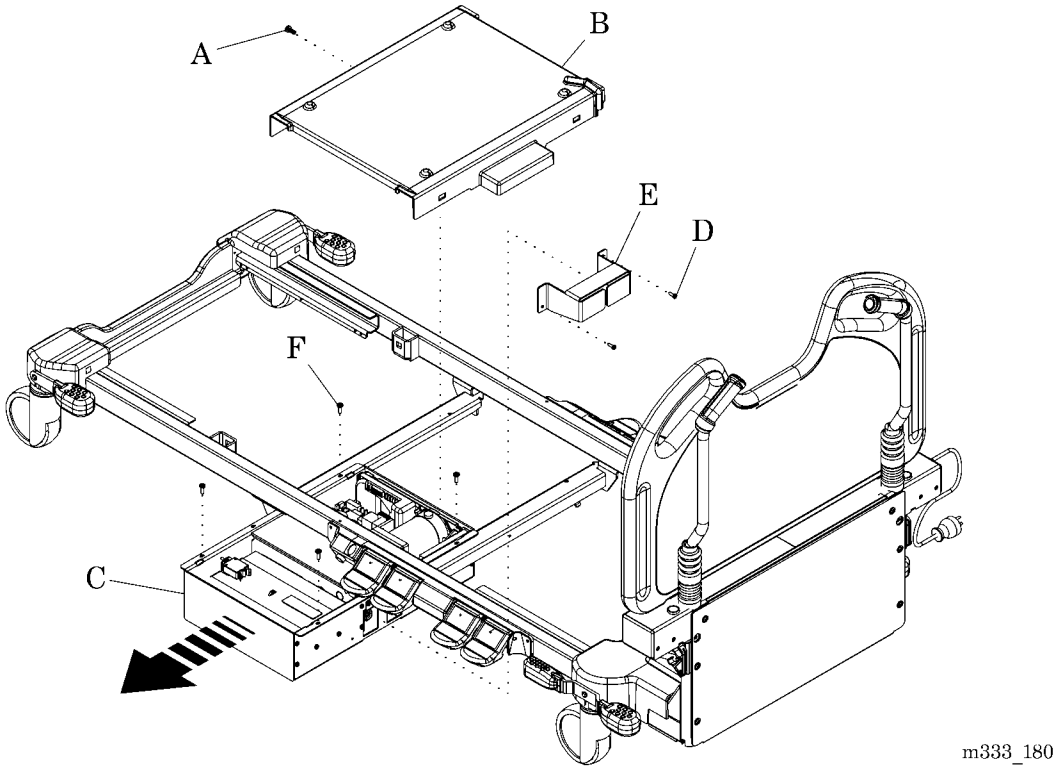
1. Set the brakes.

WARNING:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

2. Unplug the bed from its power source.

3. Remove the screw (A) securing the cover (B) to the drive box (C) (see figure 4-56 on page 4-107).

Figure 4-56. Cover Removal



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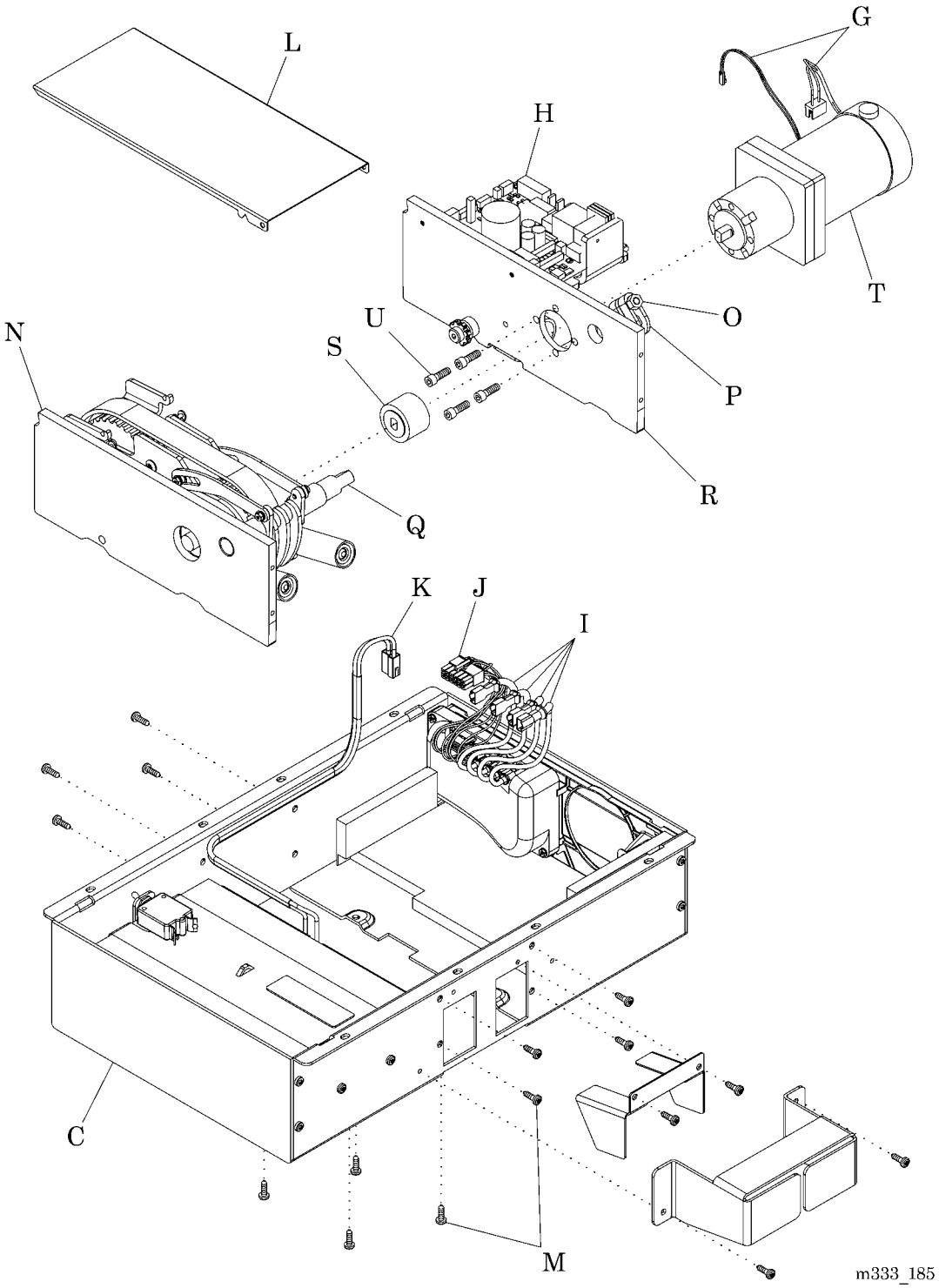
4. Remove the cover (B).
5. Disconnect the cable inside the cover (B) from the PACM board.
6. Remove the two screws (D) securing the shroud (E) to the drive box (C).
7. Remove the shroud (E).
8. Remove the four screws (F) securing the drive box (C) to the bed.
9. Remove the drive box (C) from the bed.
10. Disconnect the two drive motor cables (G) from the PACM board (H) (see figure 4-57 on page 4-109).
11. Disconnect the four controller wires (I) from the PACM board (H).
12. Disconnect the controller harness (J) from the PACM board (H).
13. Disconnect the battery cable (K) from the PACM board (H).
14. Remove the cover (L).
15. Remove the 12 screws (M) securing the drive assembly (N) to the drive box (C).

NOTE:
The remaining screws on the box may need to be loosened to allow the drive assembly to be easily removed.

16. Remove the drive assembly (N) from the drive box (C).
17. Loosen the nut (O) on the linear actuator lever (P).
18. Disconnect the linear actuator lever (P) from the drive assembly rod (Q).
19. Remove the drive assembly (N) from the motor mounting plate (R).
20. Remove the drive motor coupler (S) from the drive motor (T).
21. Remove the four screws (U) securing the drive motor (T) to the motor mounting plate (R).
22. Remove the drive motor (T) from the motor mounting plate (R).

Figure 4-57. Drive Motor Removal



4

Replacement

1. Do the removal procedure in reverse order.

NOTE:
The battery end of the drive box goes toward the patient's left side of the bed.

2. To make sure the VersaCare™ Bed operates correctly, do the "Function Checks" on page 2-6.

4.36 Drive Belt—IntelliDrive® Transport System

Tools required: T25 Torx®[1] head screwdriver

Removal

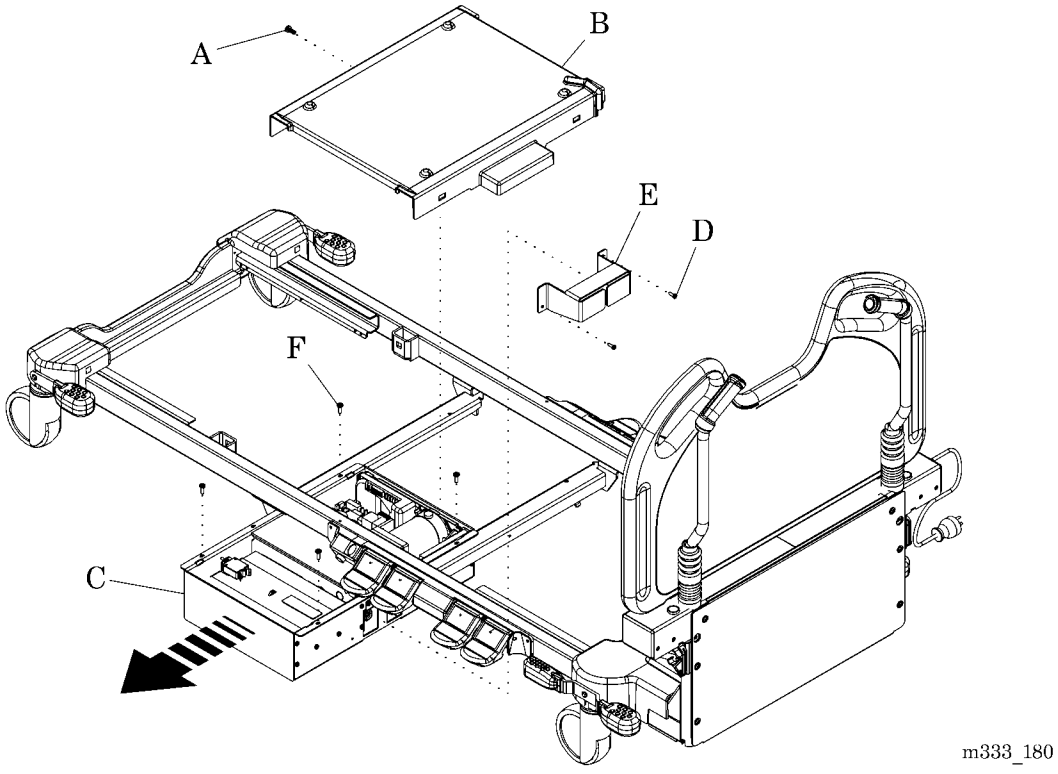
1. Set the brakes.

WARNING:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

2. Unplug the bed from its power source.

3. Remove the screw (A) securing the cover (B) to the drive box (C) (see figure 4-58 on page 4-111).

Figure 4-58. Cover Removal



4. Remove the cover (B).

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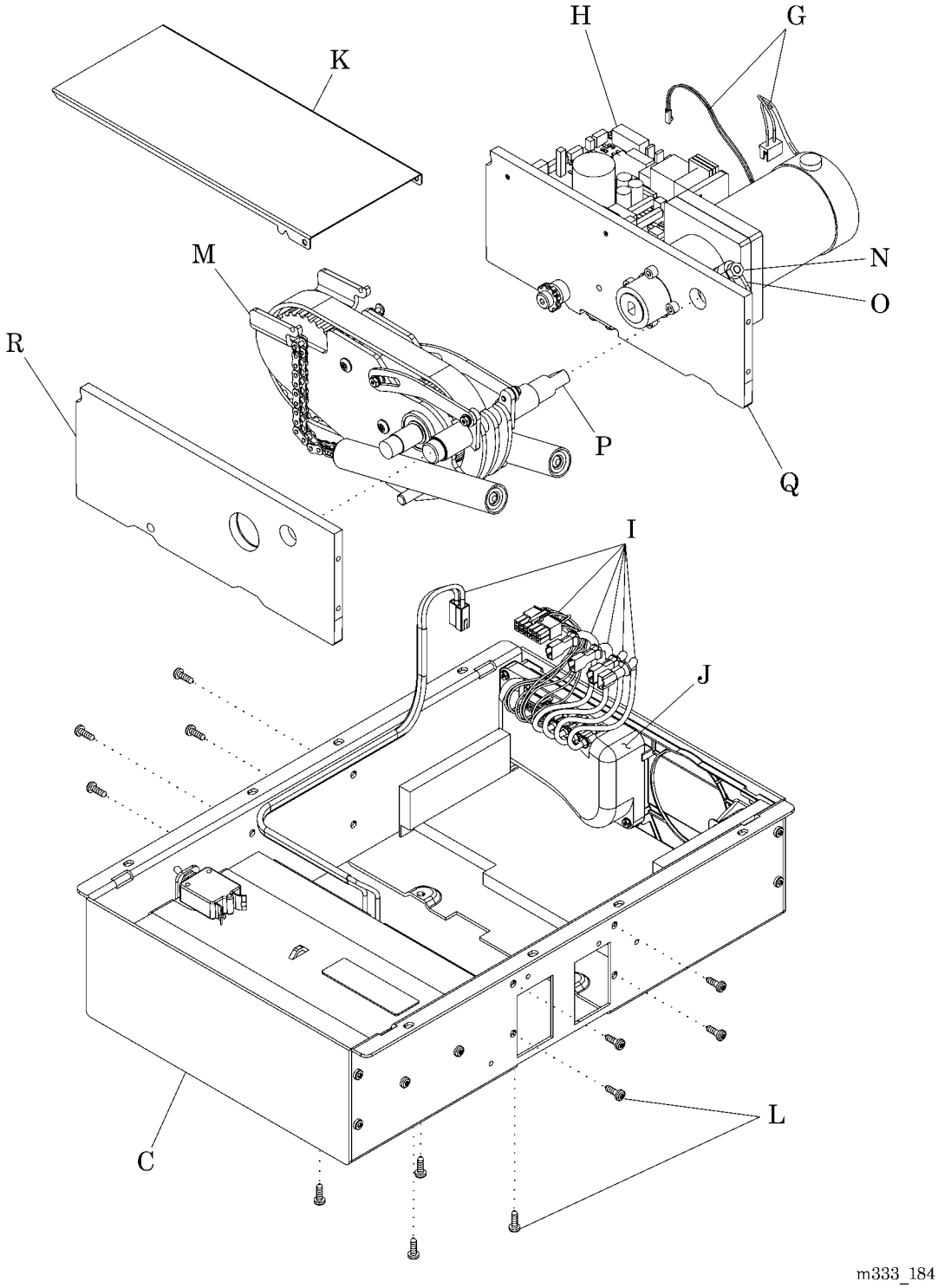
5. Disconnect the cable inside the cover (B) from the PACM board.
6. Remove the two screws (D) securing the shroud (E) to the drive box (C).
7. Remove the shroud (E).
8. Remove the four screws (F) securing the drive box (C) to the bed.
9. Remove the drive box (C) from the bed.
10. Disconnect the two drive motor cables (G) from the PACM board (H) (see figure 4-59 on page 4-113).
11. Disconnect the wires (I) from the controller (J) and the PACM board (H).
12. Remove the cover (K).
13. Remove the 12 screws (L) securing the drive assembly (M) to the drive box (C).

NOTE:
The remaining screws may need to be loosened to allow the drive assembly to be easily removed.

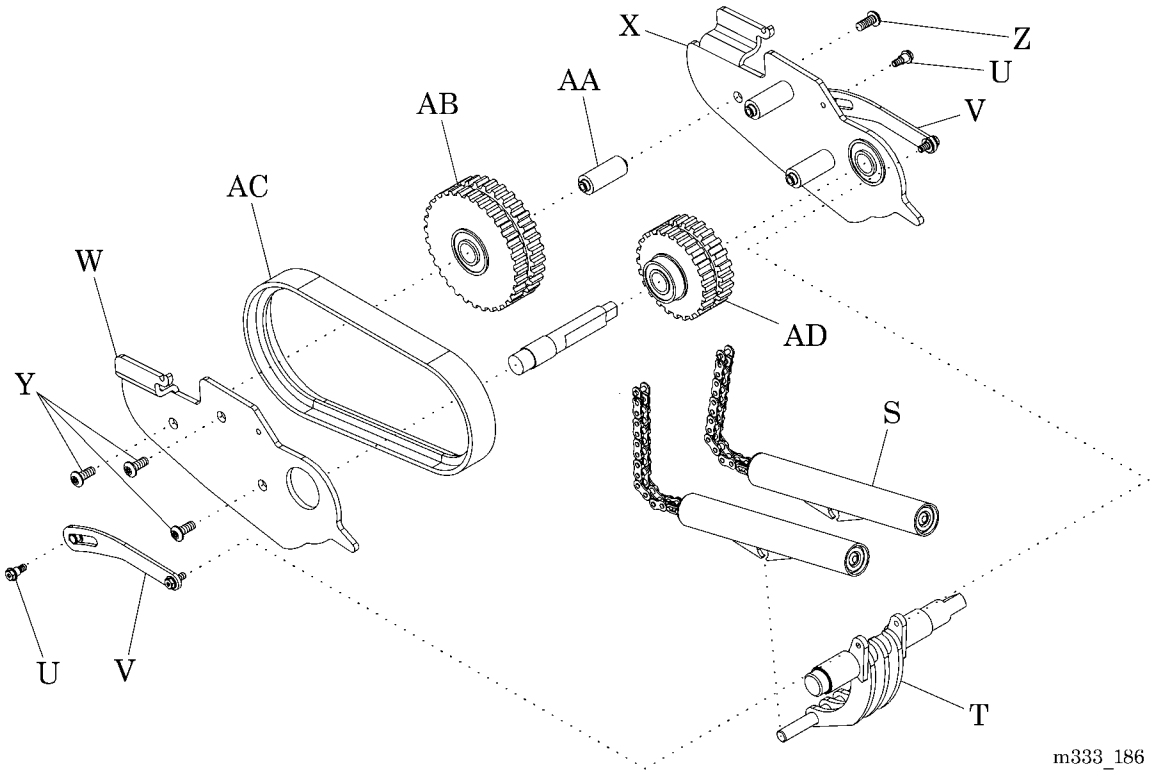
14. Remove the drive assembly (M) from the drive box (C).
15. Loosen the nut (N) on the linear actuator lever (O).
16. Disconnect the linear actuator lever (O) from the drive assembly rod (P).
17. Remove the drive assembly (M) from the motor mounting plate (Q).
18. Remove the drive plate (R) from the drive assembly (M).

Figure 4-59. Drive Unit Removal



19. Remove the chain and spring assembly (S) from the plate (T) (see figure 4-60 on page 4-114).

Figure 4-60. Drive Belt Removal



20. Remove the two screws (U) securing the return links (V) to the pulley side plates (W) and (X).

21. Rotate the return links (V) up and out of the way.

22. Remove the three screws (Y) securing the left-side pulley plate (W) to the drive assembly.

23. Remove the left-side pulley plate (W).

24. Remove the screw (Z) securing the right-side pulley plate (X) to the pulley shaft (AA).

25. Remove the pulley (AB) and belt (AC) from the drive assembly.

26. Remove the belt (AC) from the two pulleys (AB) and (AD).

NOTE:
Each pulley has a groove running down the middle of it to accept the raised section on the drive belt.

Replacement

1. Do the removal procedure in reverse order.

2. To make sure the VersaCare™ Bed operates correctly, do the "Function Checks" on page 2-6.

4.37 Transport Handle—IntelliDrive® Transport System

Tools required: T25 Torx®[1] head screwdriver
Wire cutters
7/16" open end wrench
Voltmeter
Jewelers screwdriver

Removal

1. Set the brakes.

SHOCK HAZARD:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

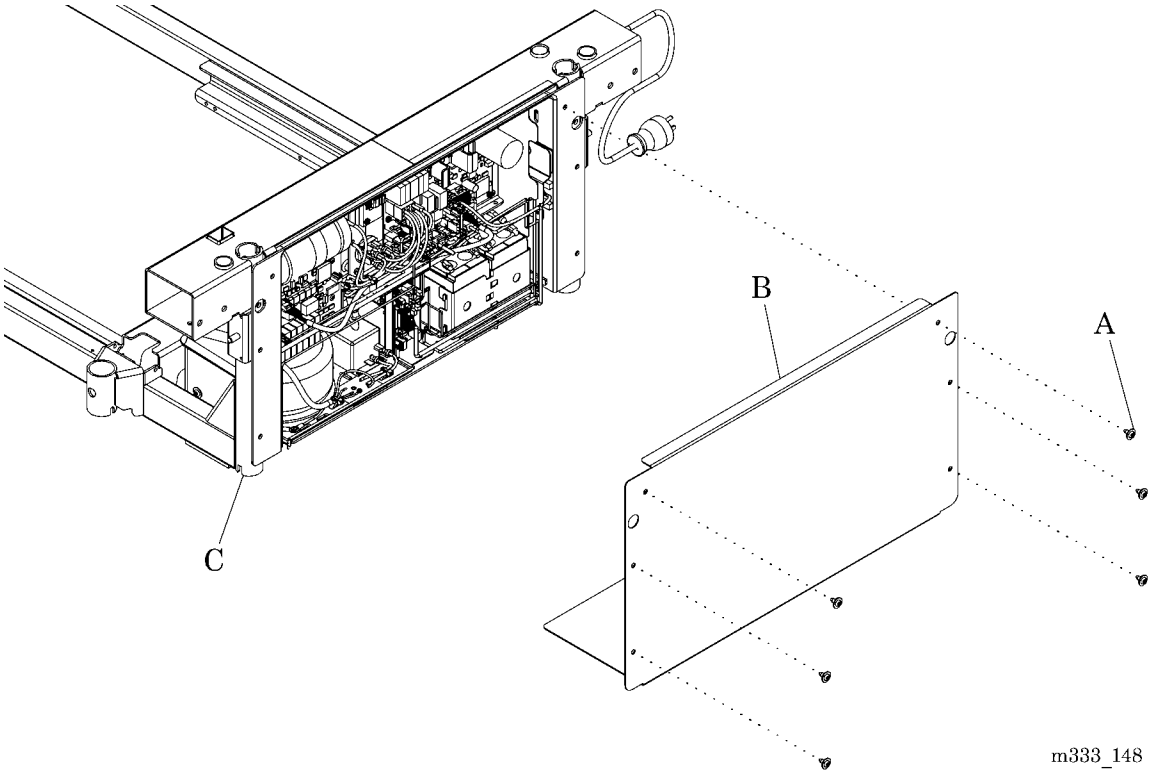
2. Unplug the bed from its power source.

3. Remove the six screws (A) securing the power supply cover (B) to the bed (C) (see figure 4-61 on page 4-117).

4. Remove the power supply cover (B) from the bed (C).

1. Torx® is a registered trademark of Textron, Inc.

Figure 4-61. Cover Removal

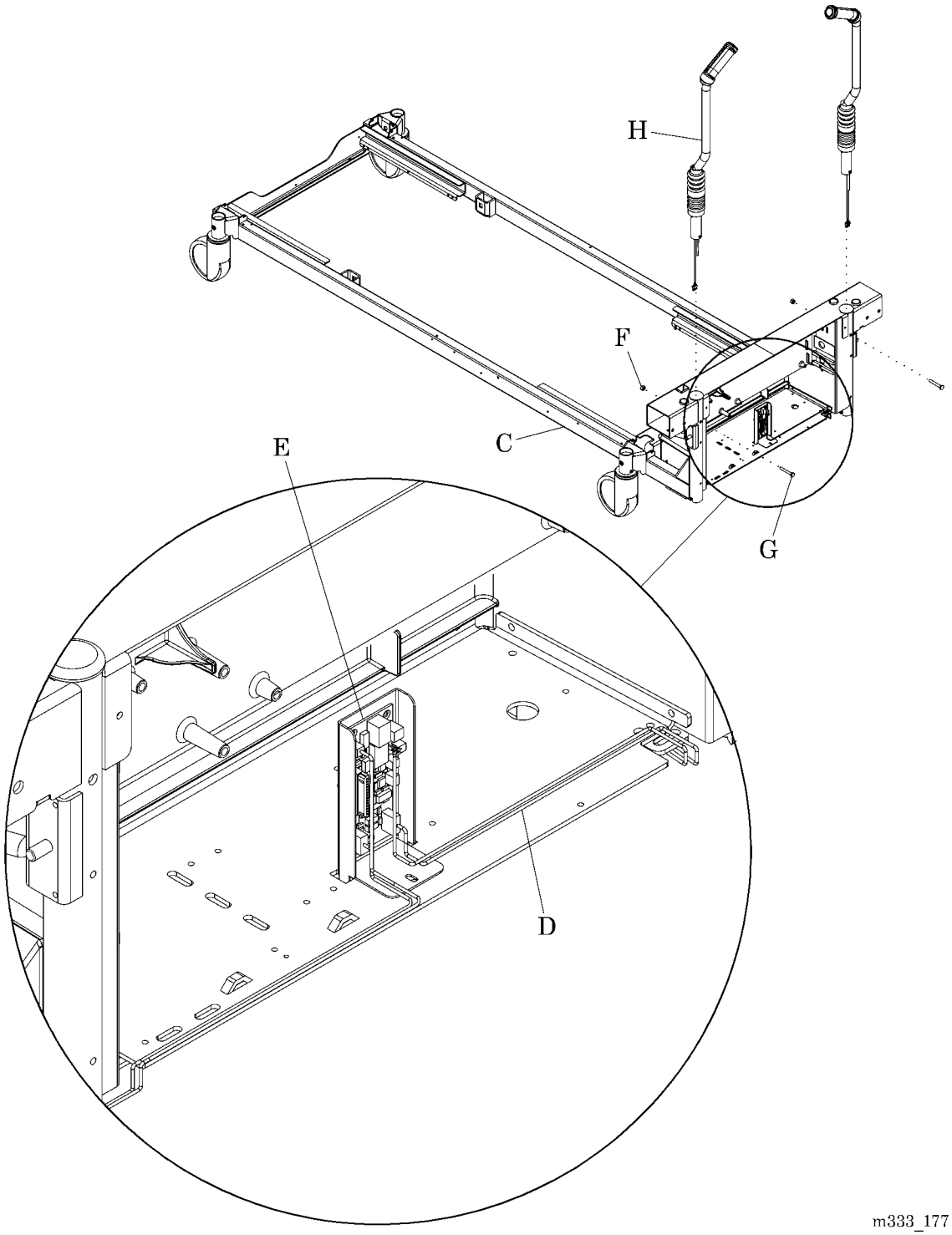


5. Disconnect the transport handle cables (D) from the interface P.C. board (E) (see figure 4-62 on page 4-118).

6. Remove the nut (F) and screw (G) securing the transport handle (H) to the bed (C).

7. Remove the transport handle (H) from the bed (C).

Figure 4-62. Transport Handle



Replacement

1. Thread the transport handle cables (D) of the new transport handle (H) through the bed (C).
2. Install the transport handle (H) on the bed (C).
3. Align the mounting hole in the transport handle (H) with the hole in the bed (C).
4. Install the screw (G) and nut (F) through the bed (C) and transport handle (H).
5. Stow the transport handle (H).
6. Route and connect the transport handle cables (D) to the interface P.C. board (E):
   - Connect the enable switch cable (two-pin) to connector **P5** on the interface P.C. board (E).
   - Connect the strain gauge cable (five-pin) to connector **P2** on the interface P.C. board (E).
7. Using a common ground, make sure the voltage on the interface P.C. board (E) at **P6**, pin 1, is between 2.49 V DC and 2.51 V DC. If necessary, adjust **R8**.
8. Install the power supply cover (B) onto the bed (C) (see figure 4-61 on page 4-117).
9. Install the six screws (A) to secure the power supply cover (B) to the bed (C).
10. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.38 Motor Controller—IntelliDrive® Transport System

Tools required: T25 Torx®[1] head screwdriver
Hilow cylinder braces—SA1695
T15 Torx® screwdriver

Removal

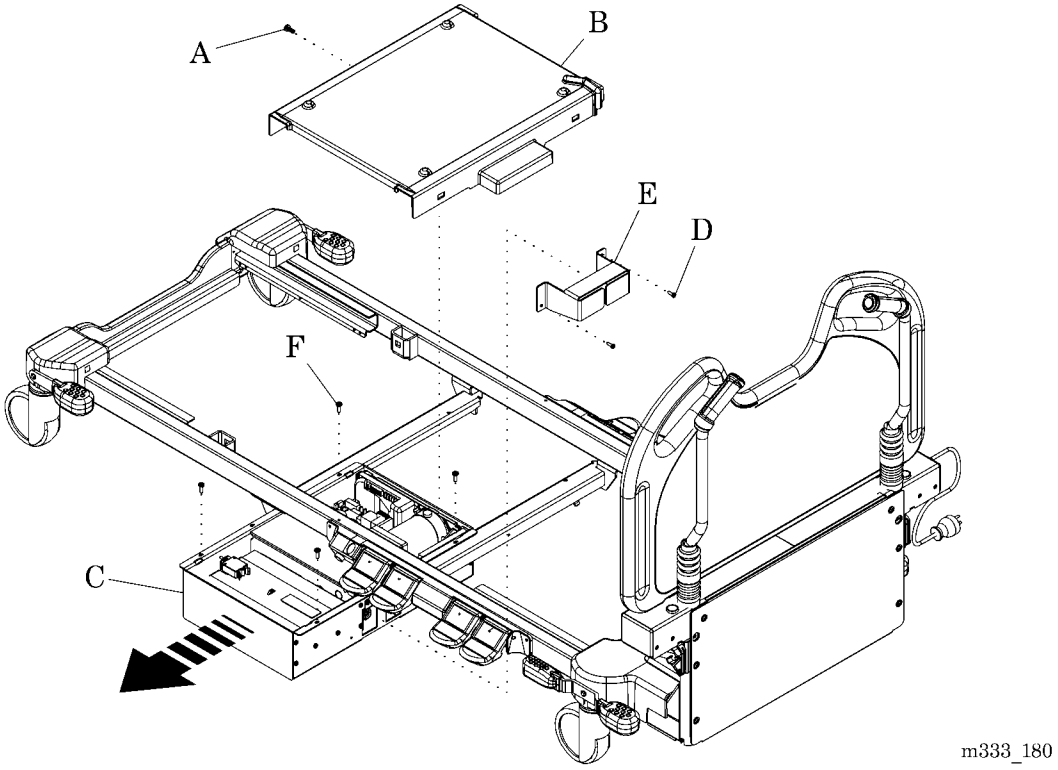
1. Set the brakes.

WARNING:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

2. Unplug the bed from its power source.

3. Remove the screw (A) securing the cover (B) to the drive box (C) (see figure 4-63 on page 4-120).

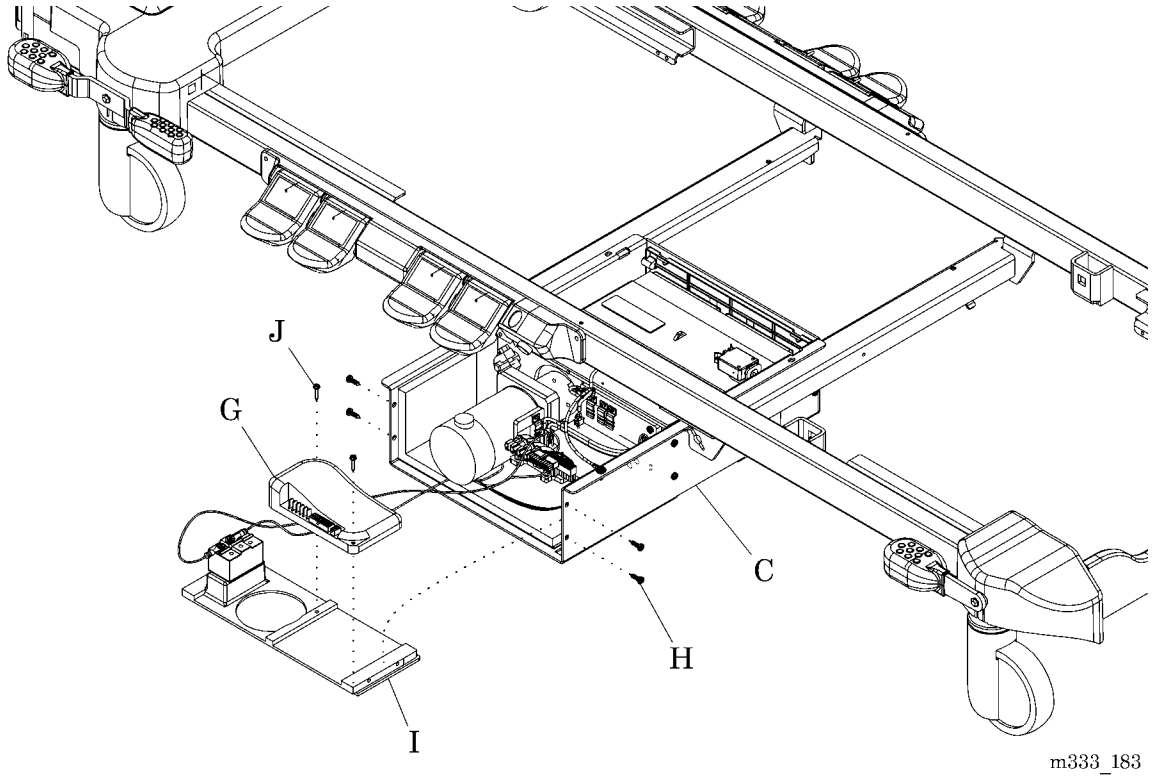
Figure 4-63. Cover Removal



1. Torx® is a registered trademark of Textron, Inc.

4. Remove the cover (B).
5. Disconnect the cable inside the cover (B) from the PACM board.
6. Remove the two screws (D) securing the shroud (E) to the drive box (C).
7. Remove the shroud (E).
8. Remove the four screws (F) securing the drive box (C) to the bed.
9. Slide the drive box (C) to the patient's right side of the bed until the motor controller is exposed.
10. Disconnect the wires from the motor controller (G) (see figure 4-64 on page 4-121).

Figure 4-64. Motor Controller



11. Remove the four screws (H) that secure the end plate (I) to the drive box (C).
12. Remove the end plate (I) from the drive box (C).

NOTE:
There is no need to disconnect the wires from the override switch in the end plate.

13. Remove the two screws (J) that secure the motor controller (G) to the end plate (I).

14. Remove the motor controller (G) from the end plate (I).

Replacement

1. Do the removal procedure in reverse order.

2. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.39 Head Section Bladder Assembly

Tools required: Window cleaner
Wire cutters
Rags

Removal

1. Set the brakes.
2. Raise the sleep surface to a comfortable working height.

WARNING:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

3. Unplug the bed from its power source.
4. Unzip the ticking (A) on the mattress (see figure 4-65 on page 4-124).
5. Pull the ticking (A) to the foot end of the mattress.
6. Pull the shear liner (B) to the foot end of the mattress.
7. Pull the fire barrier (C) to the foot end of the mattress to expose the head section bladder assembly (D).

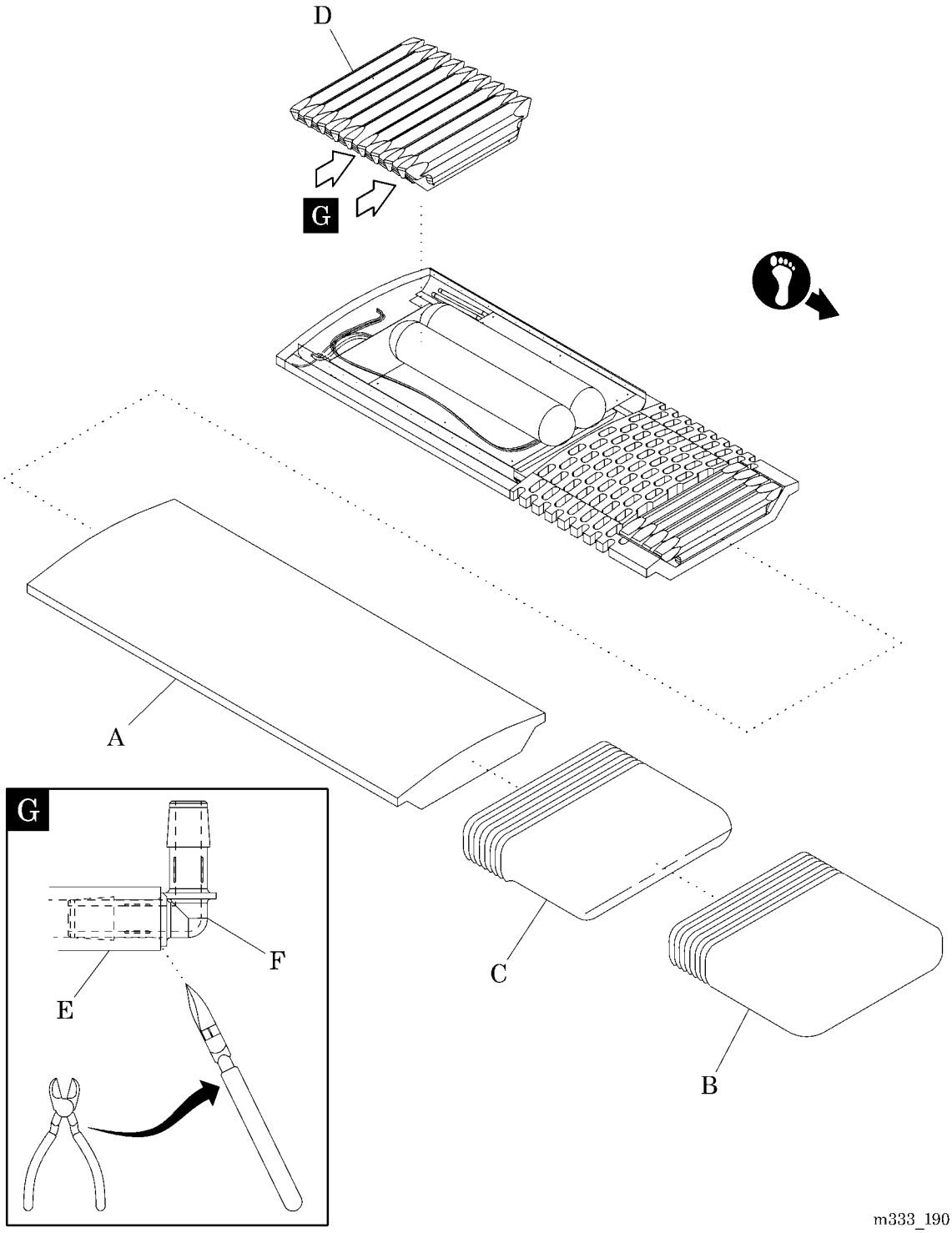
CAUTION:
Use care when disconnecting the hose from the fitting. Excessive force can damage the fitting.

8. On the right side of the fifth and ninth bladders (pink in color), disconnect the fitting (F) from the hose (E).

NOTE:
Putting the wire cutters between the fitting and hose, and then wiggling the wire cutters back and forth will loosen the hose enough for easy removal.

9. Disconnect the snaps on each end of each bladder (two snaps per end of each bladder).
10. Remove the head section bladder assembly (D) from the mattress.

Figure 4-65. Head Section Bladder Assembly



Replacement

1. Lightly spray the ends of the fitting (F) with window cleaner.
2. Install the fitting (F) onto the bladder port until fully seated.
3. Do the removal procedure in reverse order.
4. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.40 Seat Section Bladder Assembly

Tools required: Window cleaner
Wire cutters
Rags

Removal

1. Set the brakes.
2. Raise the sleep surface to a comfortable working height.

WARNING:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

3. Unplug the bed from its power source.
4. Unzip the ticking (A) on the mattress (see figure 4-66 on page 4-127).
5. Pull the ticking (A) to the foot end of the mattress.
6. Pull the shear liner (B) to the foot end of the mattress.
7. Pull the fire barrier (C) to the foot end of the mattress to expose the seat section bladder assembly (D).

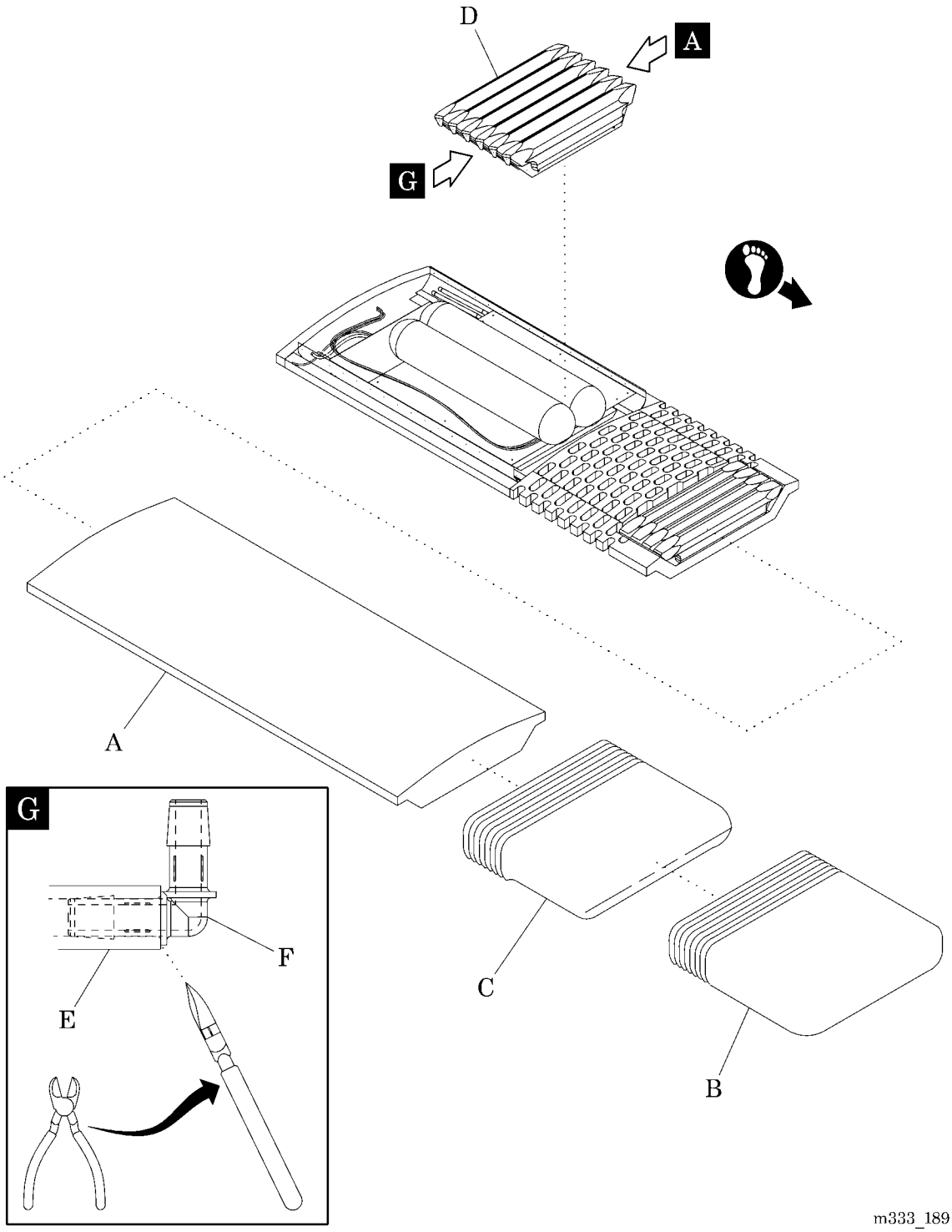
CAUTION:
Use care when disconnecting the hose from the fitting. Excessive force can damage the fitting.

8. On the right side of the fourth bladder (pink in color), disconnect the fitting (F) from the hose (E).
9. On the left side, disconnect the fitting (F) from the orange tube.

NOTE:
Putting the wire cutters between the hose and fitting, and then wiggling the wire cutters back and forth will loosen the hose enough for easy removal.

10. Disconnect the snaps on each end of each bladder (two snaps per end of each bladder).
11. Remove the seat section bladder assembly (D) from the mattress.

Figure 4-66. Seat Section Bladder Assembly



Replacement

1. Lightly spray the ends of the fitting (F) with window cleaner.
2. On the right side, install the fitting (F) into the bladder port until fully seated.
3. On the left side, install the fitting into the orange tube.
4. Do the removal procedure in reverse order.
5. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.41 Foot Section Bladder Assembly

Tools required: Window cleaner
Wire cutters
Rags

Removal

1. Set the brakes.
2. Raise the sleep surface to a comfortable working height.

WARNING:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

3. Unplug the bed from its power source.
4. Unzip the ticking (A) on the mattress (see figure 4-67 on page 4-130).
5. Pull the ticking (A) to the foot end of the mattress.
6. Pull the shear liner (B) to the foot end of the mattress.
7. Pull the fire barrier (C) to the foot end of the mattress to expose the foot section bladder assembly (D).

CAUTION:
Use care when disconnecting the hose from the fitting. Excessive force can damage the fitting.

8. On the right side of the first and fourth bladders, disconnect the fitting (F) from the bladder ports.

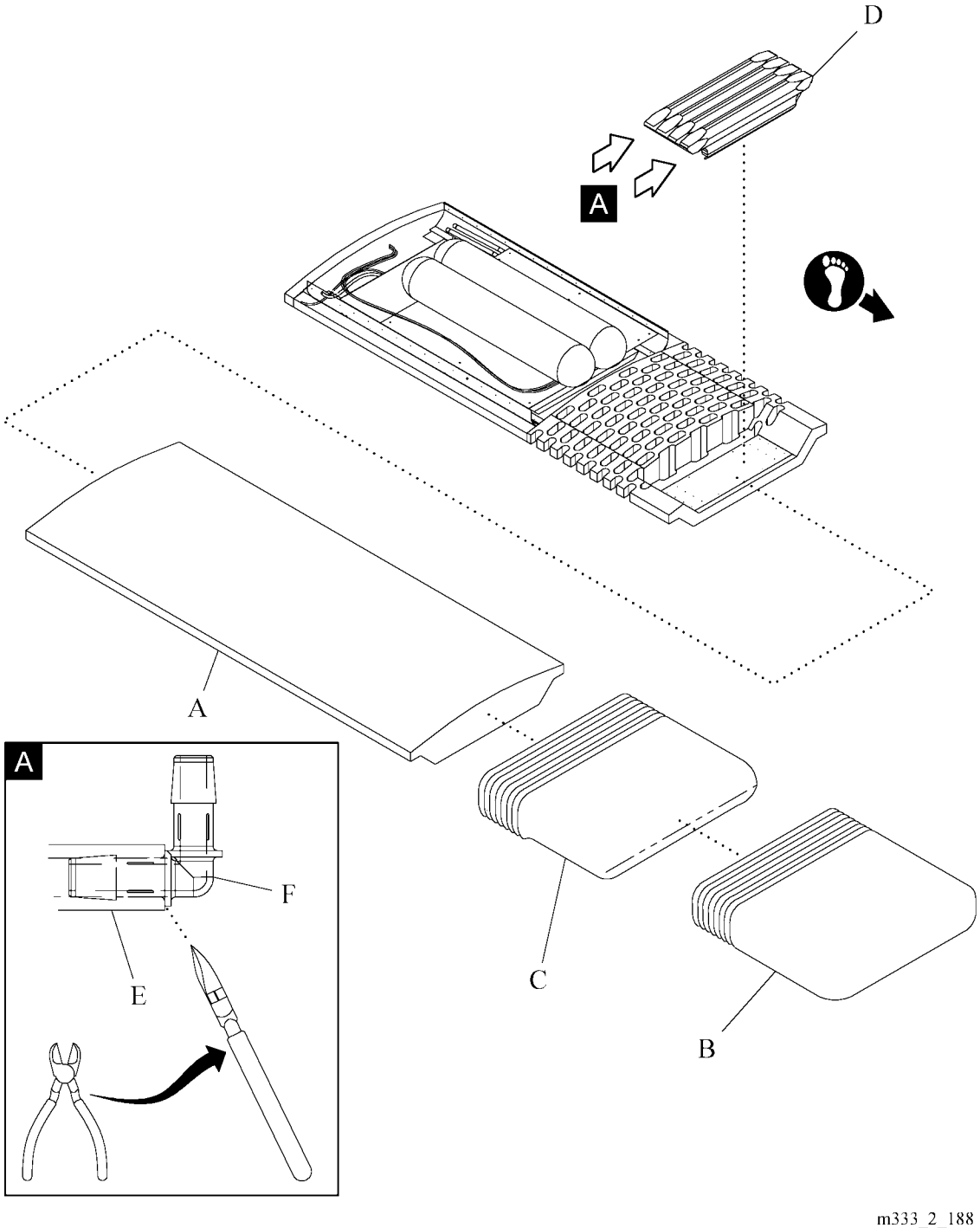
NOTE:
Putting the wire cutters between the hose and fitting, and then wiggling the wire cutters back and forth will loosen the hose enough for easy removal.

9. Disconnect the snaps on the ends of each bladder (D).

NOTE:
There are two snaps on each end of the bladder.

10. Remove the foot section bladder assembly (D) from the mattress.

Figure 4-67. Foot Section Bladder Assembly



Replacement

1. Lightly spray the ends of the fitting (F) with window cleaner.
2. Install the fitting (F) into the bladder ports until fully seated.
3. Do the removal procedure in reverse order.
4. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

4.42 Turn Assist Bladder Assembly

Tools required: Window cleaner
Wire cutters
Rags

Removal

1. Set the brakes.
2. Raise the sleep surface to a comfortable working height.

WARNING:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

3. Unplug the bed from its power source.
4. Unzip the ticking (A) on the mattress (see figure 4-68 on page 4-133).
5. Pull the ticking (A) to the foot end of the mattress.
6. Pull the shear liner (B) to the foot end of the mattress.
7. Pull the fire barrier (C) to the foot end of the mattress to expose the head and seat section bladder assemblies.

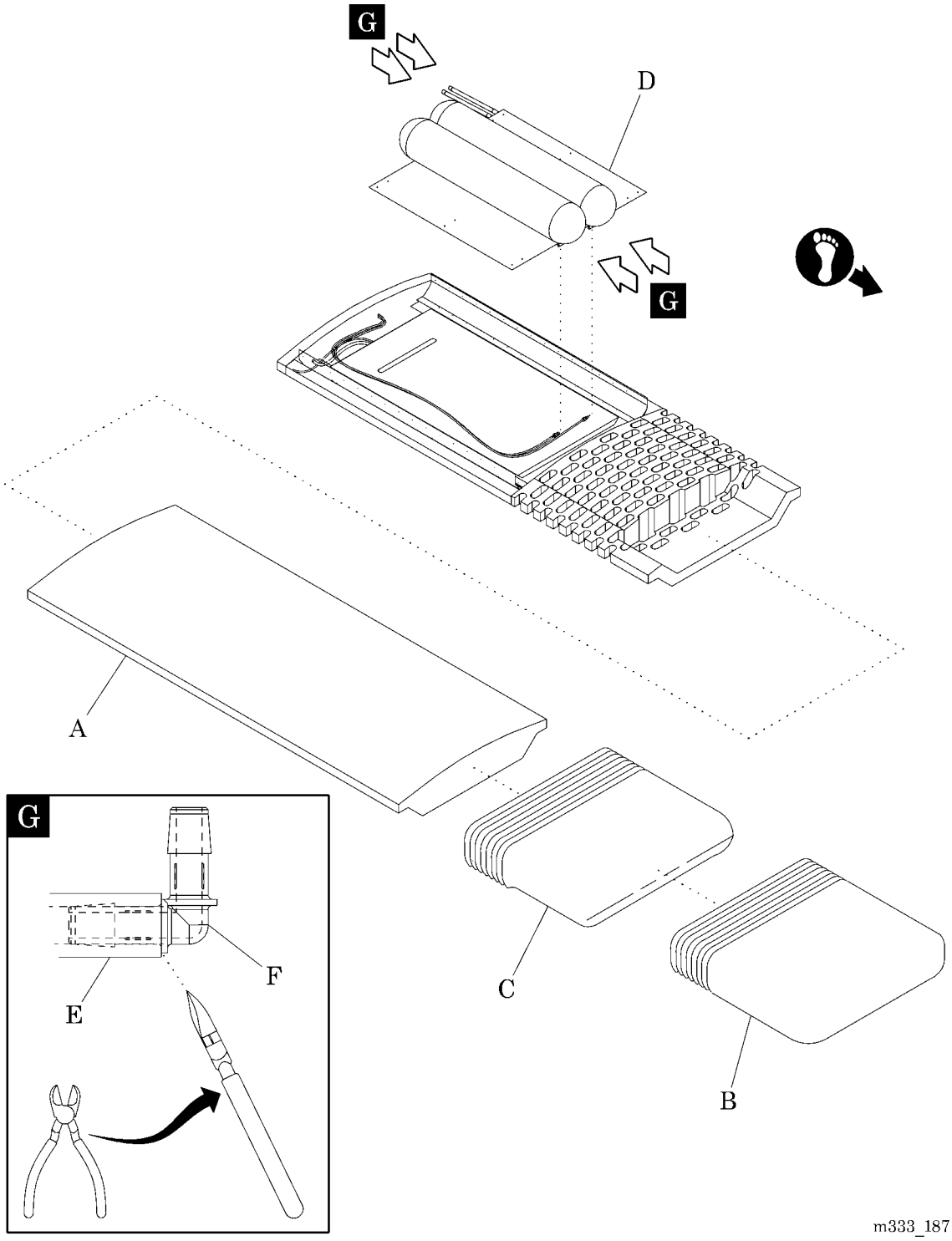
CAUTION:
Use care when disconnecting the hose from the fitting. Excessive force can damage the fitting.

8. At the head end of the bladder assembly (D), disconnect the fittings (F) from the bladder ports.

NOTE:
Putting the wire cutters between the hose and fitting, and then wiggling the wire cutters back and forth will loosen the hose enough for easy removal.

9. At the foot end of the bladder assembly (D), disconnect fittings (F) from the bladder ports.
10. Disconnect the 12 snaps on the bladder assembly (six snaps per side).
11. Remove the turn assist bladder assembly (D) from the mattress.

Figure 4-68. Turn Assist Bladder Assembly



Replacement

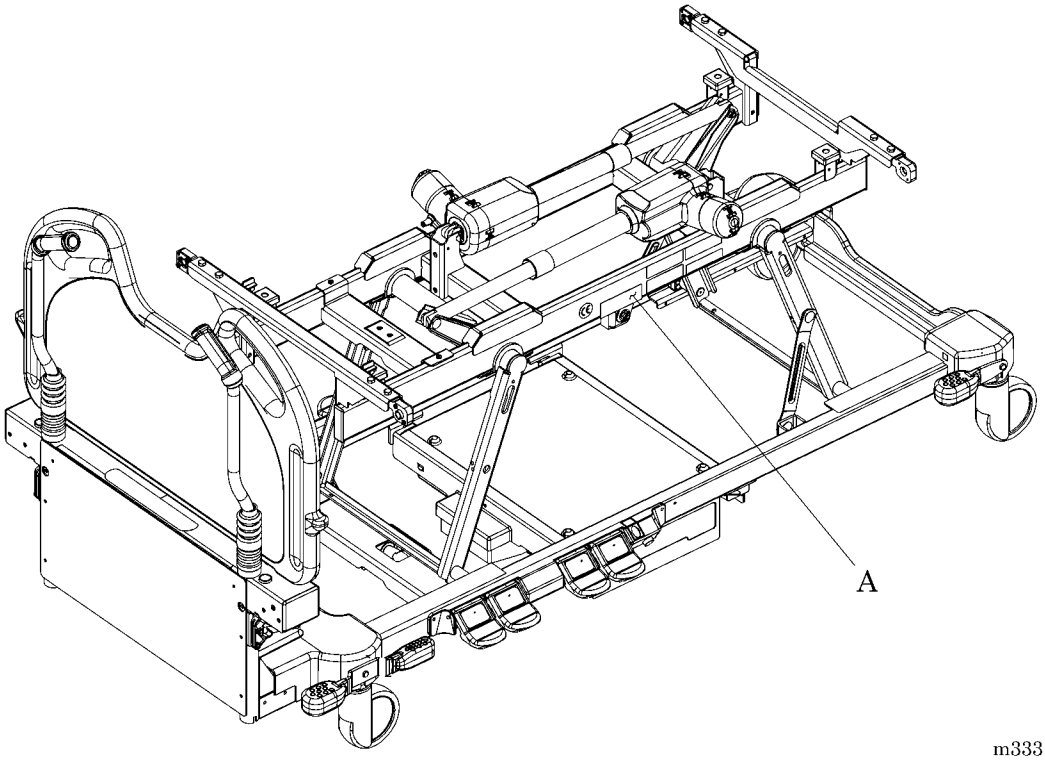
1. Lightly spray the ends of the fitting (F) with window cleaner.
2. Install the fittings (F) into the bladder ports until fully seated.
3. Do the removal procedure in reverse order.
4. To make sure the VersaCare™ Bed operates correctly, do the “Function Checks” on page 2-6.

Chapter 5
Parts List

Service Parts Ordering

Using the parts lists in this manual, identify the part number(s) you require. Find the product number and serial number on the product identification label (A) (see figure 5-1 on page 5-1).

Figure 5-1. Product Identification Label Location



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Call Hill-Rom Technical Support at (800) 445-3720 with the following information:

- Customer account number
- Purchase order number
- Product number
- Serial number
- Part number(s)

To promptly order parts, request part prices and availability, or follow up on a service order, use the following Hill-Rom fax number:

(812) 934-8472

Terms:

- Net 30 days
- F.O.B. Batesville, IN
- Prepaid shipping charges added to invoice
- All orders shipped UPS ground unless specified

Address all inquiries to:

ATTN TECHNICAL SUPPORT—PARTS
HILL-ROM COMPANY, INC.
1069 STATE ROUTE 46 E
BATESVILLE IN 47006-9167

Address all return goods to:

ATTN SERVICE STORES
DISTRIBUTION CENTER DOOR D23
HILL-ROM COMPANY, INC.
COUNTY ROAD 300E
BATESVILLE IN 47006-9167

NOTE:
To eliminate possible delays or incorrect billings, **do not** return any items without a Return Material Authorization (RMA) number. When a return is requested, an RMA packet is included with each order. This packet includes an RMA number, instructions, and a shipping label. If an RMA number is not available, obtain one by phoning Hill-Rom Technical Support at (800) 445-3720.

Exchange Policy

The following are policies for in-warranty and out-of-warranty exchanges from Hill-Rom.

In-Warranty Exchanges

In some cases, Hill-Rom will request that parts/products be returned for inspection. When this occurs, you are expected to return parts/products within 30 days of receipt of the exchange part. If you fail to return the inoperative parts/products within the 30 day period, Hill-Rom will invoice your facility for the full selling price of the parts/products.

NOTE:
The preceding billing procedure pertains **only** to parts/products that Hill-Rom requests to be returned.

In some cases, the invoice accompanying the parts will show the full selling price (only for internal use at Hill-Rom). Do not confuse this price with your price.

Do not return any parts without an RMA number. When parts/products have been requested to be returned, Hill-Rom will include an RMA packet with the parts/products shipment. If an RMA number is not available, obtain one by phoning Hill-Rom Technical Support at (800) 445-3720.

Out-of-Warranty Exchanges

You are expected to return the inoperative parts/products within 30 days of receipt of the exchange part. Hill-Rom will include an RMA packet with the parts/products shipment. If an RMA number is not available, obtain one by phoning Hill-Rom Technical Support at (800) 445-3720. Hill-Rom will invoice your facility for the full selling price of the parts/products. Upon return of the inoperative parts/products, Hill-Rom will issue a credit to your facility for **the difference between the exchange price and the full selling price of the parts/products**.

NOTES:

Warranty

HILL-ROM COMPANY, INC.
LIMITED WARRANTY

Hill-Rom Company, Inc. (Hill-Rom) has a long tradition of providing superior products and service to our customers. Our goal is "Total Customer Satisfaction". In that spirit, Hill-Rom is proud to offer the following warranty.

GENERAL WARRANTY (APPLICABLE UNLESS A SPECIFIC WARRANTY IS LISTED)

Hill-Rom warrants to the original purchaser that its products and replacement parts shall be free from defects in material and workmanship for a period of one (1) year from date of delivery. Hill-Rom's obligation under this warranty is expressly limited to supplying replacement parts and/or service for, or replacing, at its option, any product which is, in the sole discretion of Hill-Rom, found to be defective. In addition to the foregoing one year warranty, Hill-Rom warrants to the original purchaser that the frame and welds on its products will be free from structural defects for the life of the product. Any product upgrade or modification initiated by Hill-Rom does not affect the original product warranty.

SPECIFIC WARRANTIES

MATTRESS WARRANTIES

Hill-Rom warrants to the original purchaser that its mattress product shall be free from defects in material and workmanship for a period of two (2) years from date of delivery. However, electro mechanical mattress components (compressors, valves, printed circuit boards, hoses, and couplers) are covered by the general one (1) year warranty.

EXPENDABLES WARRANTIES

A sixty (60) day limited warranty from date of delivery applies to expendable parts such as cushions, coverlets, software diskettes, locator badge batteries, dome light incandescent bulbs, overhead fluorescent tubes, heating elements, temperature probes, filter sheets, and microspheres. This warranty is limited to replacement of the parts covered.

TO OBTAIN PARTS AND SERVICE

In the United States, call Hill-Rom Technical Support Department at (800) 445-3720, Monday through Friday. In Canada, call Hill-Rom Technical Support Department at (800) 267-2337, Monday through Friday. Outside the United States and Canada, call your authorized Hill-Rom Distributor. In order to expedite service, we request you furnish the following information: customer identification number, product model number, serial number, and description of problem. A qualified specialist will provide, via telephone (United States and Canada), or FAX (Outside the United States and Canada), troubleshooting assistance for facility personnel and provide necessary parts to make repairs. If troubleshooting determines the need for on-site technical service, a qualified service representative will be dispatched. Replacement of non-technical items will be the responsibility of the customer. If requested by Hill-Rom, products or parts for which a warranty claim is made shall be returned prepaid to Hill-Rom's factory.

OUT OF WARRANTY EXCHANGE POLICY

After the expiration of the original warranty, upon request, Hill-Rom will ship as a replacement, components such as selected: motors and printed circuit boards, for like units returned to Hill-Rom by the original purchaser at a substantial savings. Please call Hill-Rom Technical Support Department for current pricing.

PARTS AVAILABILITY POLICY

Hill-Rom will offer parts for new and remanufactured products for ten (10) years from date of sale; for communications products for five (5) years from date of sale.

Note: Some original component parts and assemblies may not be available; functional equivalents may be substituted.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS WARRANTIES AND IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS OF PURPOSE. HILL-ROM'S OBLIGATION UNDER THESE WARRANTIES SHALL NOT INCLUDE ANY LIABILITY FOR LOSS OF PROFITS, DIRECT, INDIRECT OR CONSEQUENTIAL DAMAGES OR DELAYS. Some states, provinces, or countries do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion or limitation may not apply. Any improper or negligent use, any alterations or repairs not in accordance with Hill-Rom's manuals or performed by others in such manner as in Hill-Rom's sole judgment affects the product materially and adversely, shall void these warranties. These warranties do not cover failures due to misuse, abuse, neglect, or lack of routine maintenance. No employee or representative of Hill-Rom is authorized to change these warranties in any way or grant any other warranty unless in writing and signed by a Hill-Rom officer. These warranties provide specific legal rights; but, there may be other available rights, which vary from state to state, province to province, or country to country.

Revised July 6, 2001

Hill-Rom Company, Inc., 1069 State Route 46 E, Batesville, IN 47006-9167

NOTES:

Recommended Spare Parts

For a recommended spare parts list to service five or more units, see table 5-1 on page 5-7.

Table 5-1. Recommended Spare Parts

Part Number	Quantity	Description
129674	1	Hardware kit
70548	4	Tube cap
71039	1	Caster cover assembly, head, rh
70169	1	Caster cover assembly, head, lh
69581	2	End cap
70277	2	IV clip
69777	4	Slide
6997203	1	Hilow motor
6997201	1	Head section motor
69580	1	Caster cover, foot end
6390601	2	Caster, 5" (125 mm), brake
6390602	2	Caster, 5" (125 mm), brake/steer
7042501	1	Nightlight assembly
127886	1	Foot control assembly, lh
127887	1	Foot control assembly, rh
71007	1	Cover, head
7100602	1	Cover, foot, rh
7100601	1	Cover, foot, lh
72476	1	Gasket
69839	1	Pin
69841	1	Bushing
70377	1	Gasket
4840501	2	Battery
70883	1	Gasket
34512P	1	Dummy plug
7061001	1	Fuse, 120 V beds
69361	1	Transformer, 120 V beds

Part Number	Quantity	Description
69726	1	Capacitor
7038101	1	Wiper, upper, rh
70463	1	Wiper, movable
7000203	1	Motor, foot extension
7038102	1	Wiper, upper, lh
69934	1	Compressor
72578	24	Cover, screw
7074901	1	PPM sensor, head
7074902	2	PPM sensor, seat
72506	60	Rivet, plastic
71051	2	Sensor strip, head end (air beds only)
69996	1	Gasket
72295	1	P.C. board, pod
72284	1	P.C. board, head siderail
72289	1	P.C. board, power supply board assembly
72270	1	P.C. board, logic control assembly
72273	1	P.C. board, motor control assembly

NOTES:

Base Frame

Figure 5-2. Base Frame

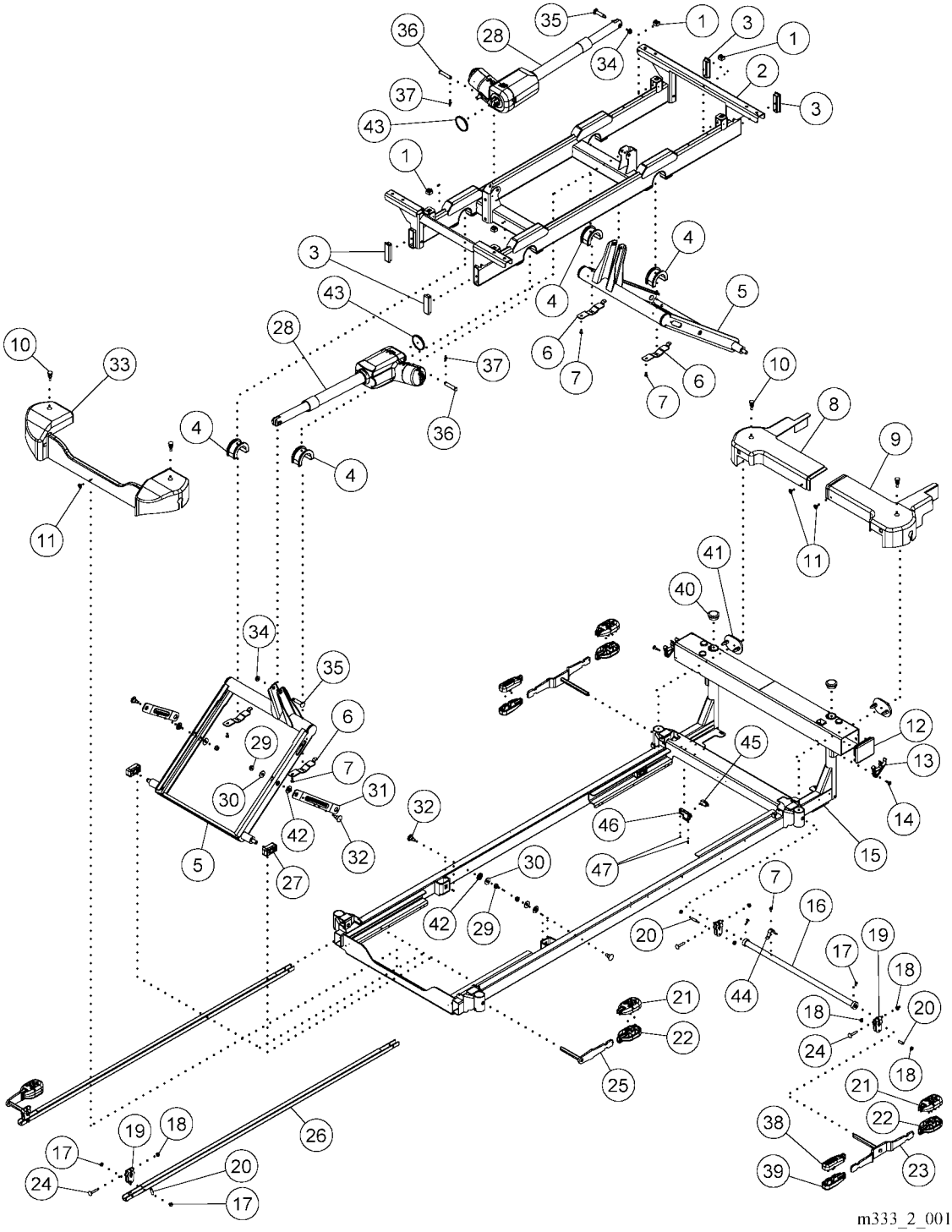

Table 5-2. Base Frame

Item Number	Part Number	Quantity	Description
1	70750 (3200)	4	Nut, cage (non-scale beds only)
2	69756 (3200)	1	Weldment, intermediate frame
3	70458 (3200)	4	Tube cap
4	69771 (3200)	4	Bearing, plastic, lift arm
5	69759 (3200)	2	Weldment, lift arm
6	69772 (3200)	4	Bracket, bearing to lift arm
7	70341 (3200)	8	Screw
8	71039 (3200)	1	Caster cover, head end right
9	70169 (3200)	1	Caster cover, head end left
10	129623 (3200)	4	Fastener
11	71993 (3200)	3	Screw
12	69581 (3200)	2	End cap, head end
13	70277 (3200)	2	IV clip
14	70882 (3200)	2	Screw
15	69553 (3200)	1	Weldment, base
16	69587 (3200)	1	Torque tube
17	70342 (3200)	2	Screw
18	70376 (3200)	4	Nut
19	70771 (3200)	4	Bracket, brake/steer arm
20	70346 (3200)	4	Pin, dowel
21	70779 (3200)	4	Brake/steer pedal, top, large
22	70778 (3200)	4	Brake/steer pedal, bottom, large
23	69571 (3200)	2	Brake/steer pedal weldment (head end)
24	70375 (3200)	4	Bolt
25	6957048 (3200)	2	Weldment, brake/steer, front
26	69557 (3200)	2	Brake/steer link
27	69777 (3200)	4	Slide, hilow lift
28	6997203 (3200)	2	Drive, hilow
29	70428 (3200)	4	Nut
30	70222 (3200)	4	Washer
31	69764 (3200)	2	Ground link

Item Number	Part Number	Quantity	Description
32	70384 (3200)	4	Bolt
33	69580 (3200)	1	Caster cover, foot end
34	70428 (3200)	2	Nut
35	70383 (3200)	2	Bolt
36	70787 (3200)	2	Pin, clevis
37	61615 (3200)	2	Rue ring, cotter
38	70781 (3200)	2	Brake/steer pedal, top, small
39	70780 (3200)	2	Brake/steer pedal, bottom, small
40	70833 (3200)	2	Cover
41	72037 (3200)	2	Bumper
42	44092 (3200)	4	Bushing
43	72360 (3200)	2	Insulator ring
44	69575 (3200)	1	Lever, brake/steer switch
45	19512 (3200)	1	Switch
46	69574 (3200)	1	Holder, brake switch
47	70342 (3200)	2	Screw
48 (not shown)	129667 (3200)	1	Base assembly service (includes: 8, 9, 10, 11, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 33, 38, and 39)

NOTES:

Casters

Figure 5-3. Casters

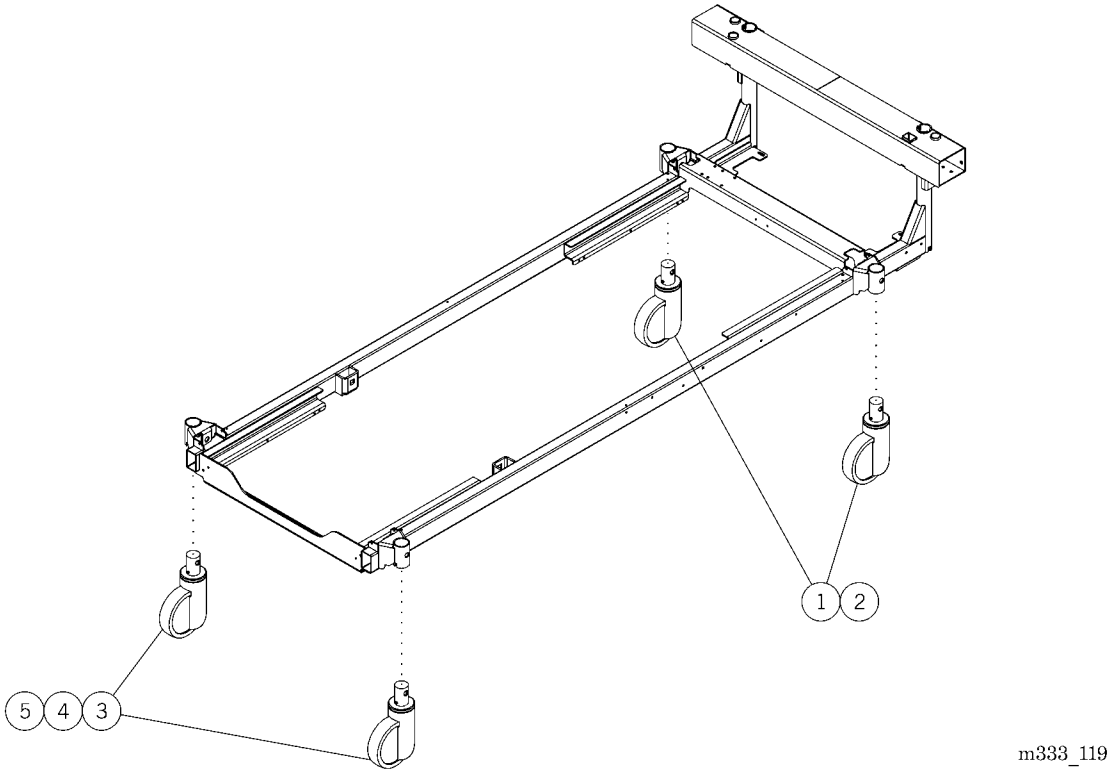

Table 5-3. Casters

Item Number	Part Number	Quantity	Description
1	6390601 (3200)	2	Caster, 5" (12.7 cm) brake
2	7247801 (3200)	2	Caster, 6" (15 cm) brake
3	6390602 (3200)	2	Caster, 5" (12.7 cm) brake/steer
4	7247803 (3200)	2	Caster, 6" (15 cm) brake/steer
5	7247802 (3200)	2	Caster, 6" (15 cm) brake (IntelliDrive® Transport System only)

NOTES:

Obstacle Detection

Figure 5-4. Obstacle Detection

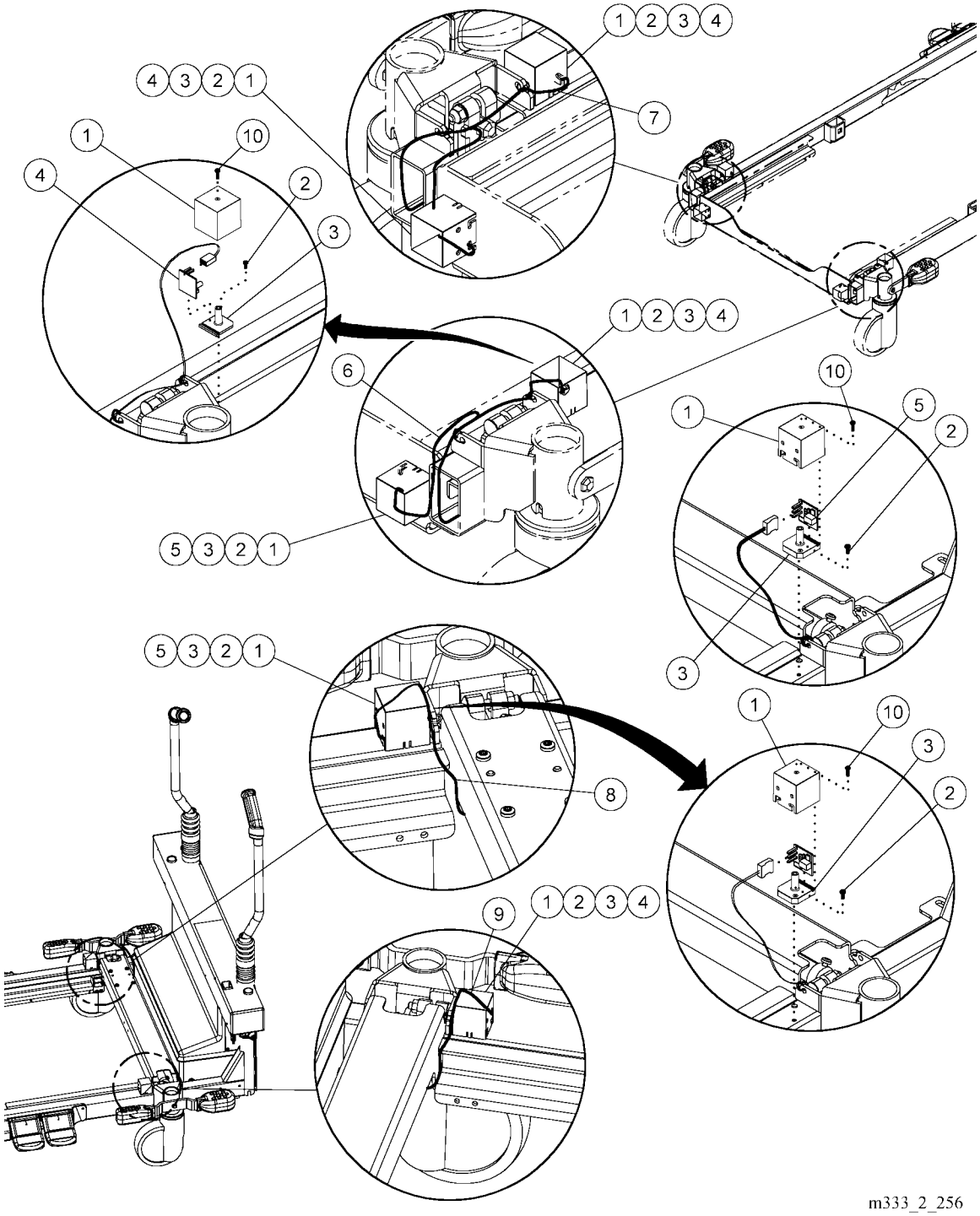

Table 5-4. Obstacle Detection

Item Number	Part Number	Quantity	Description
1	72021 (3200)	1	Cover, obstacle detect
2	69988 (3200)	1	Screw
3	72020 (3200)	1	Base, obstacle detect
4	72294 (3200)	1	Emitter
5	72293 (3200)	1	Detector
6	69455 (3200)	1 (per side)	Cable assembly, foot end
7	19124 (3200)	1	Wire tie
8	69221 (3200)	1	Cable assembly, head right
9	69456 (3200)	1	Cable assembly, head left
10	71639 (3200)	1	Screw, hi-lo

Foot Controls

Figure 5-5. Foot Controls

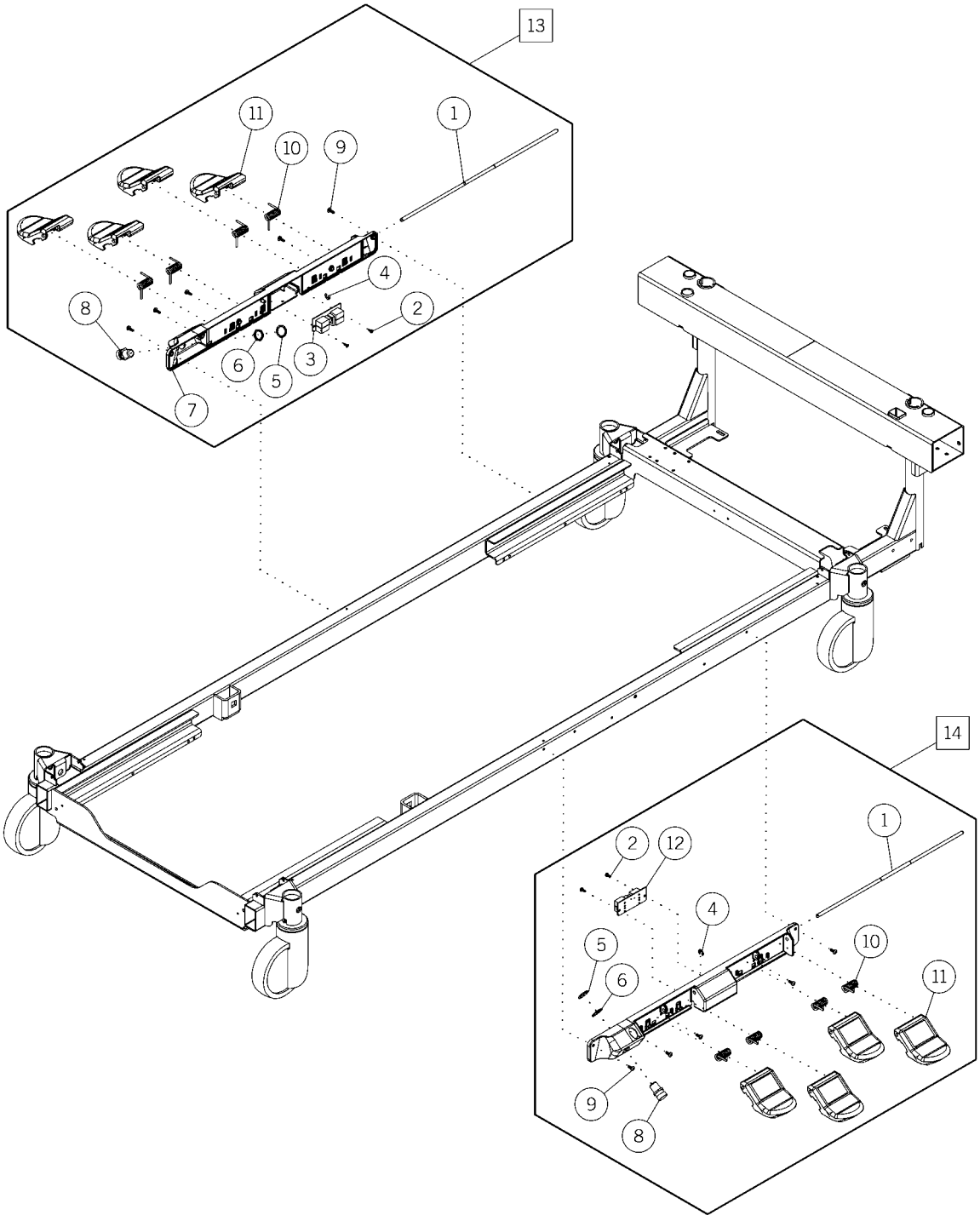

Table 5-5. Foot Controls

Item Number	Part Number	Quantity	Description
1	69905 (3200)	1	Pin
2	4214101 (3200)	2	Screw
3	72296 (3200)	1	Foot control board, rh
4	70354 (3200)	1	E-ring
5	71991 (3200)	1	Nut
6	71990 (3200)	1	Washer
7	6957802 (3200)	1	Housing, foot control, rh
8	7042501 (3200)	1	Nightlight
9	70341 (3200)	5	Screw
10	69906 (3200)	4	Spring
11	70740 (3200)	4	Pedal
12	72297 (3200)	1	Foot control board, lh
13	127887 (3200)	1	Foot control assembly, rh
14	127886 (3200)	1	Foot control assembly, lh

Articulating Frame

Figure 5-6. Articulating Frame

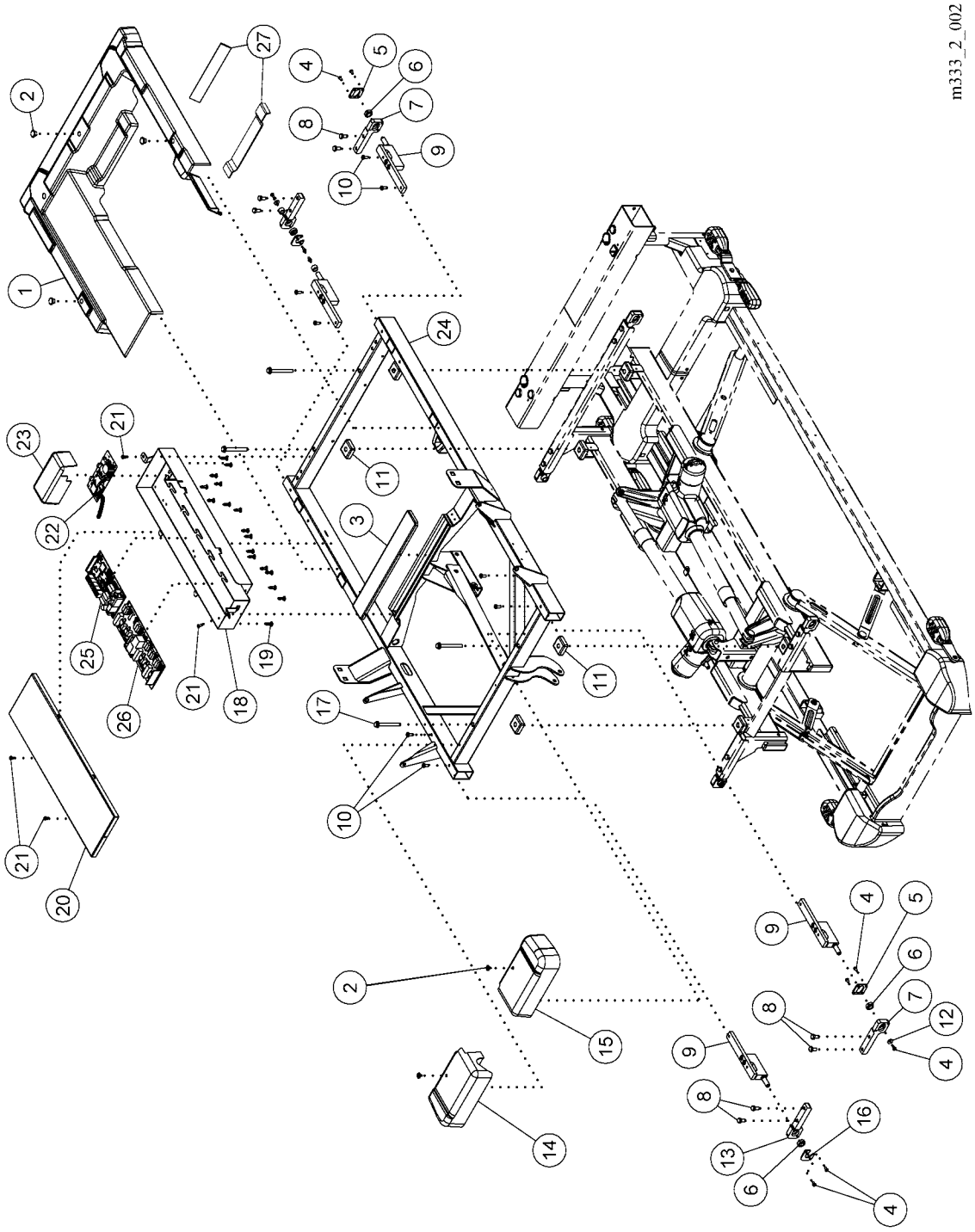

Table 5-6. Articulating Frame

Item Number	Part Number	Quantity	Description
1	71007 (3200)	1	Cover, head end weigh frame
2	71993 (3200)	1	Screw
3	70390 (3200)	1	Cover
4	70342 (3200)	5	Screw
5	70994 (3200)	2	Plate, bearing keeper, slot
6	70167 (3200)	4	Bearing
7	70165 (3200)	2	Block, intermediate frame to load cell
8	70060 (3200)	8	Screw
9	6995801 (3200)	4	Load cell assembly
	6995802 (322)	4	Load cell (OIML beds only)
10	49521 (3200)	8	Screw
11	70453 (3200)	4	Spacer, non-scale bed
12	70684 (3200)	2	Washer
13	706163 (3200)	2	Block, left intermediate frame to load cell
14	7100602 (3200)	1	Cover, foot end, rh
15	7100601 (3200)	1	Cover, foot end, lh
16	70166 (3200)	2	Plate, bearing keeper (hole)
17	70450 (3200)	4	Screw, non-scale beds
18	69703 (3200)	1	Electronic enclosure
19	3976301 (3200)	17	Standoff
20	69700 (3200)	1	Lid
21	70341 (3200)	4	Screw
22	72287 (3200) or 72286[a] (3200)	1 1	P.C. board, scale (OIML beds) P.C. board, scale (non-OIML beds)
23	71485 (3200)	1	Shield, (OIML scale beds only)
24	69627 (3200)	1	Weigh frame
25	72270 (3200)	1	Logic control P.C. board
26	72273 (3200)	1	Motor control P.C. board
27	132261 (3200)	2	Foam, sound, weigh frame cover

a. Specify software revision code when ordering new P.C. board.

Head Siderail

Figure 5-7. Head Siderail

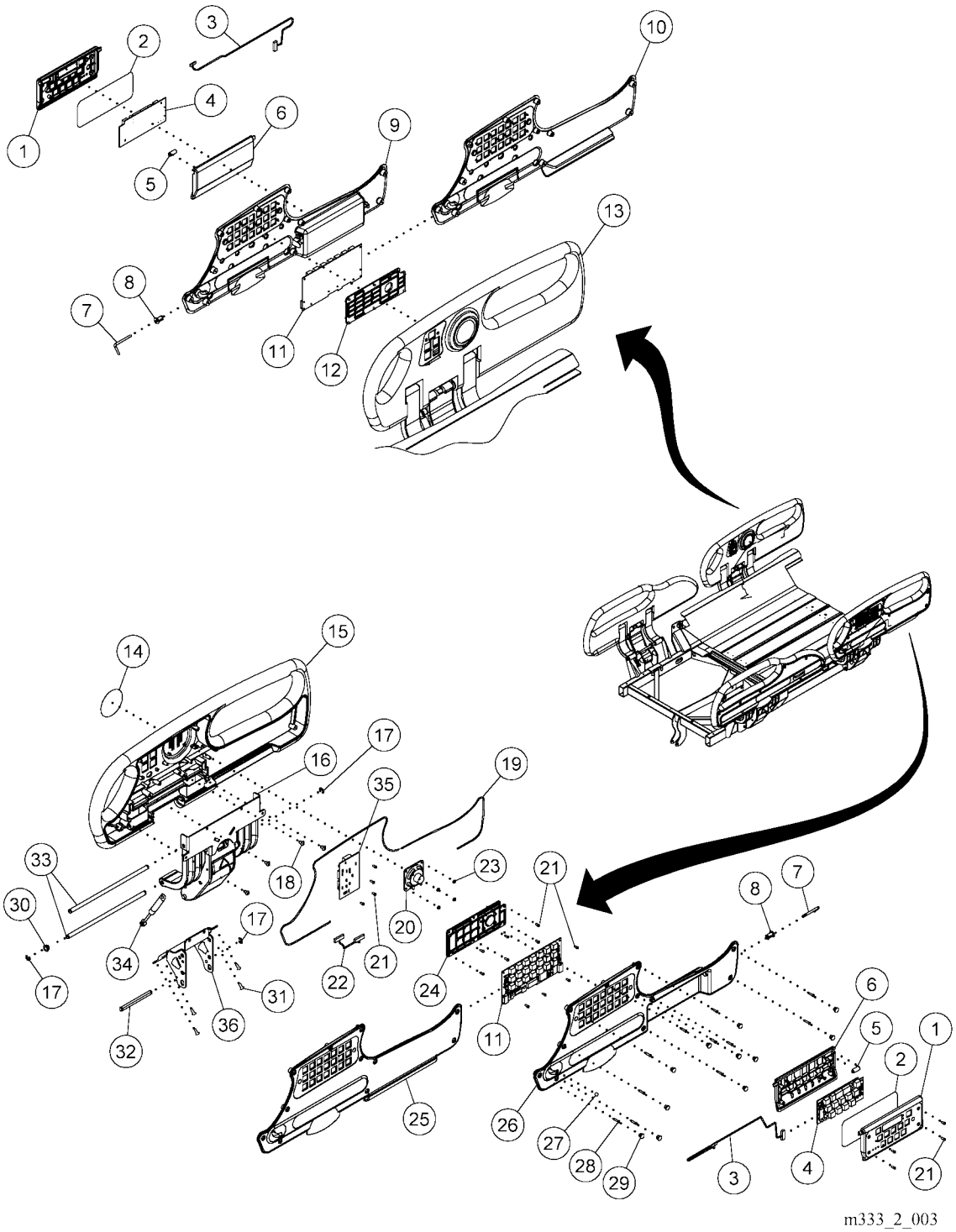

Table 5-7. Head Siderail

Item Number	Part Number	Quantity	Description
1	69830 (3200)	1	Cover, front
2	72476 (3200)	1	Gasket
3	69449 (3200)	1	Cable assembly
4	72284 (3200)	1	P.C. board assembly
5	49199 (3200)	1	Spring, lh
6	69831 (3200)	1	Cover, back
7	69839 (3200)	1	Shaft
8	69841 (3200)	1	Bushing
9	6981102 (3200)	1	Siderail cover, with pod, rh
10	6981104 (3200)	1	Siderail cover, without pod, rh
11	72282 (3200)	1	P.C. board, caregiver control
12	6982102 (3200)	1	P.C. board support plate, rh
13	6979402 (3200)	1	Siderail, head end, rh
14	49453 (3200)	2	Label, blank speaker
15	6979401 (3200)	1	Siderail, head end, lh
16	69790 (3200)	1	Mount bracket
17	35325 (3200)	3	E-ring
18	69817 (3200)	4	Screw
19	70377 (3200)	1	Gasket, siderail
20	38873 (3200)	1	Speaker
21	4214101 (3200)	18	Screw
22	69450 (3200)	1	Cable assembly, patient controls
23	28562 (3200)	4	Nut, pal
24	6982101 (3200)	1	P.C. board support plate, lh
25	6981103 (3200)	1	Siderail cover, without pod, lh
26	6981101 (3200)	1	Siderail cover, with pod, lh
27	47272 (3200)	1	Level ball
28	71639 (3200)	11	Screw
29	72578 (3200)	11	Cover, screw
30	36570 (3200)	1	Bushing
31	70341 (3200)	4	Screw

Item Number	Part Number	Quantity	Description
32	69838 (3200)	1	D-pin, siderail, short
33	69798 (3200)	1	D-pin, siderail, long
34	67230 (3200)	1	Dampener
35	72283 (3200)	1	P.C. board, patient control
36	70282 (3200)	1	Mount bracket
37 (not shown)	127888 (3200)	1	Siderail assembly, head, lh, with pod
38 (not shown)	127889 (3200)	1	Siderail assembly, head, rh, with pod
39 (not shown)	127890 (3200)	1	Siderail assembly, head, lh, without pod
40 (not shown)	127891 (3200)	1	Siderail assembly, head, rh, without pod

NOTES:

Intermediate Siderail

Figure 5-8. Intermediate Siderail

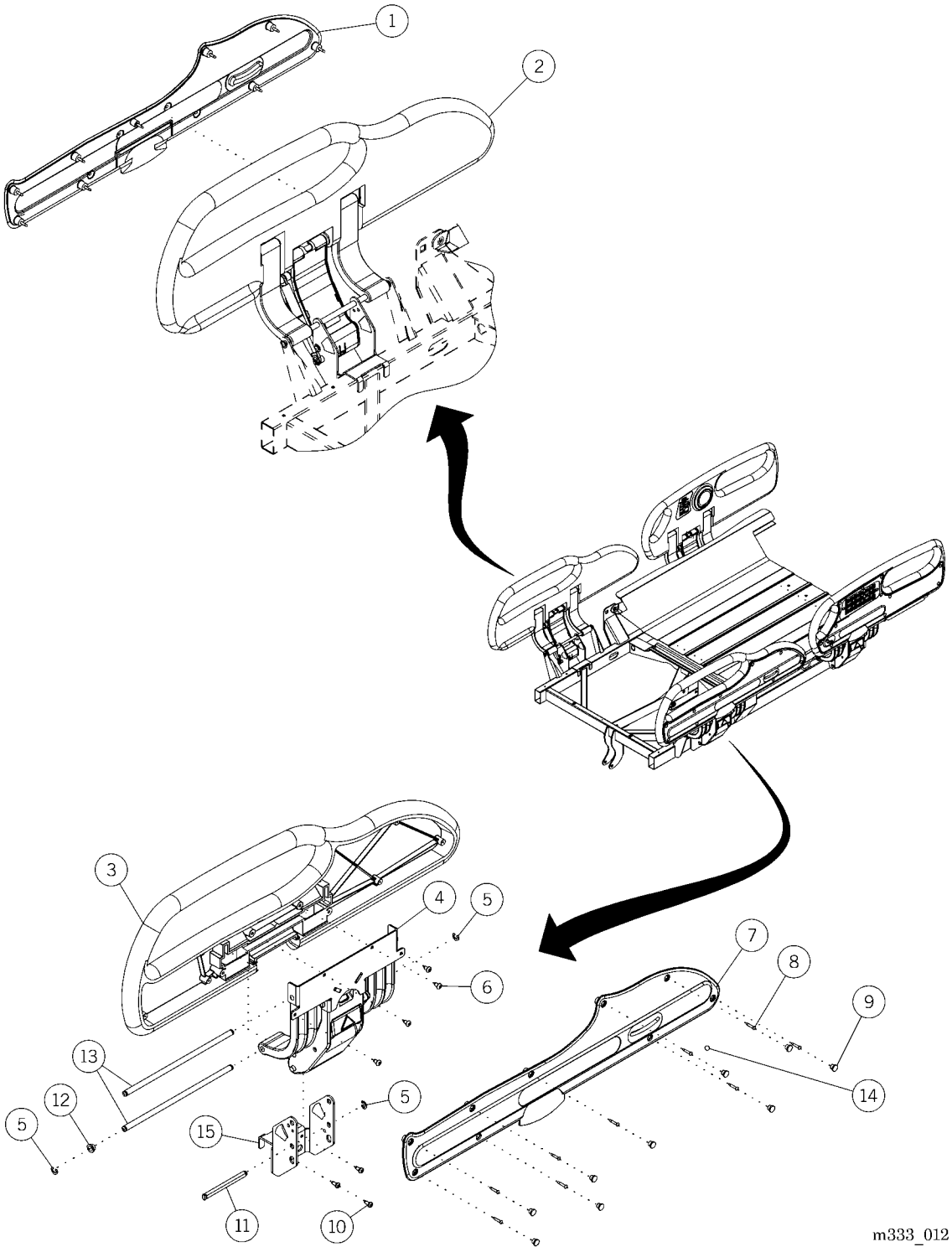

Table 5-8. Intermediate Siderail

Item Number	Part Number	Quantity	Description
1	6982302 (3200)	1	Intermediate siderail cover, rh
2	6979202 (3200)	1	Intermediate siderail, rh
3	6979201 (3200)	1	Intermediate siderail, lh
4	69790 (3200)	1	Mount bracket
5	3532501 (3200)	3	E-ring
6	69817 (3200)	4	Screw
7	6982301 (3200)	1	Intermediate siderail cover, lh
8	71639 (3200)	9	Screw
9	72578 (3200)	9	Cover, screw
10	70341 (3200)	3	Screw
11	69838 (3200)	1	D-pin, siderail, short
12	36570 (3200)	1	Bushing
13	69798 (3200)	1	D-pin, siderail, long
14	47272 (3200)	1	Level ball
15	70360 (32000	1	Mount bracket
16	127892 (3200)	1	Siderail assembly, complete, lh
17	127893 (3200)	1	Siderail assembly, complete, rh

Siderail Center Arm Assembly

Figure 5-9. Siderail Center Arm Assembly

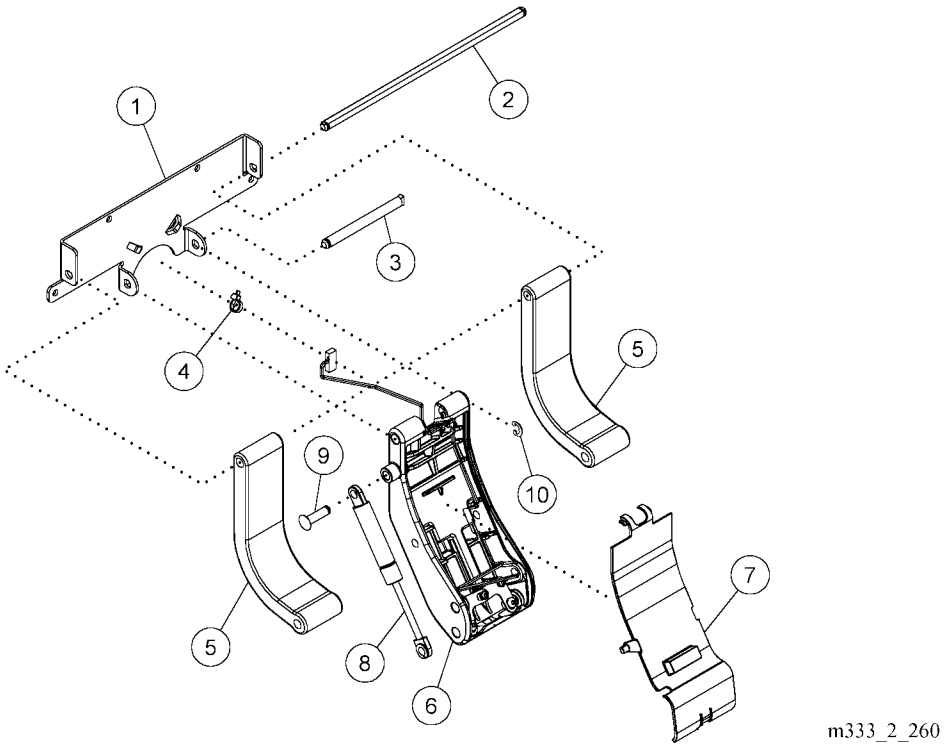

Table 5-9. Siderail Center Arm Assembly

Item Number	Part Number	Quantity	Description
1	69790 (3200)	1	Mount bracket
2	69798	1	D-pin, long
3	69838	1	D-pin, short
4	19124	1	Wire tie (head siderails only)
5	69796	2	Outer arm
6	69843	1	Center arm assembly
7	71113	1	Magnet heatstake assembly
8	67230 (3200)	1	Dampener assembly, compression
9	43394 (3200)	1	Clevis pin
10	3532501 (3200)	1	Retaining ring, E

NOTES:

Power Supply (Sheet 1 of 2)

Figure 5-10. Power Supply (Sheet 1 of 2)

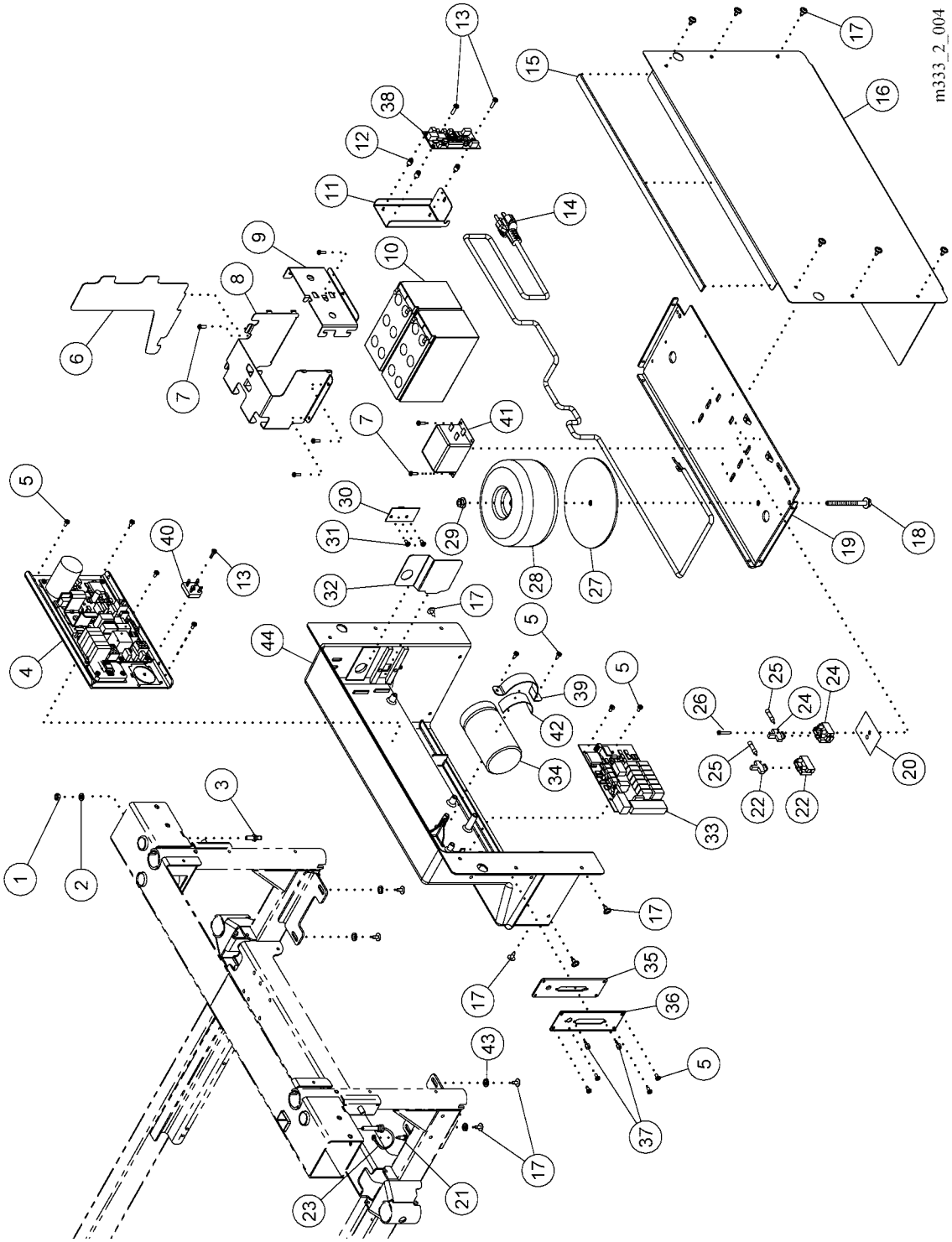

Table 5-10. Power Supply (Sheet 1 of 2)

Item Number	Part Number	Quantity	Description
1	44126 (3200)	1	Nut (230 V beds only)
2	44128 (3200)	1	Washer (230 V beds only)
3	44125 (3200)	1	Plug (230 V beds only)
4	70786 (3200)	1	Power supply P.C. board
5	69812 (3200)	12	Screw
6	69565 (3200)	1	Divider, power supply
7	69988 (3200)	2	Screw
8	69566 (3200)	1	Bracket
9	69567 (3200)	1	Bracket
10	4840501 (3200)	2	Battery
11	70356 (3200)	1	Mounting plate (IntelliDrive® Transport System only)
12	69725 (3200)	3	Standoff (IntelliDrive® Transport System only)
13	70344 (3200)	2	Screw (IntelliDrive® Transport System only)
14	126642 (3200)	1	Power cord (230 V, Italy)
	69470 (3200)	1	Power cord, (120 V beds)
	7012801 (3200)	1	Power cord, (230 V U.K beds)
	7012802 (3200)	1	Power cord, (230 V EU beds)
	126641 (3200)	1	Power cord, (230 V Swiss beds)
15	70883 (3200)	1	Gasket, power supply
16	69598 (3200)	1	Back panel
17	71993 (3200)	6	Screw
18	70450 (3200)	1	Screw
19	69562 (3200)	1	Bottom plate
20	70801 (3200)	1	Label, fuse block
21	70341 (3200)	1	Screw
22	4413806 (3200)	1	Fuse holder, terminal block
23	34512P (3200)	1	Dummy plug
24	4413807 (3200)	1	Fuse block

Item Number	Part Number	Quantity	Description
25	7061002 (3200) or 7061001 (3200)	2	Fuse, 2.5 A, 250 V (220/230/240 V beds) Fuse, 5 A, 250 V (100/110/115/120/127 V beds)
26	70348 (3200)	1	Screw
27	70751 (3200)	1	Pad, transformer
28	69060 (3200) or 69361 (3200)	1	Transformer, 660 V A (230 V beds) Transformer, 666 V A (120 V beds)
29	70428 (3200)	1	Nut
30	72301 (3200)	1	Battery enable switch assembly
31	69812 (3200)	2	Screw
32	71690 (3200)	1	Cover, P.C. board enable switch
33	72298 (3200)	1	SideCom® Communication System P.C. board
34	69726 (3200)	1	Capacitor
35	69573 (3200)	1	Gasket, SideCom® Communication System
36	69593 (3200) or 70783 (3200)	1	Cover, SideCom® Communication System Cover, blank
37	42006 (3200)	2	Screw
38	72299 (3200)	1	Junction P.C. board, IntelliDrive® Transport System beds only
39	70638 (3200)	1	Clamp
40	4992802 (3200)	1	Bridge rectifier
41	70611 (3200)	1	Power line filter
42	65790 (3200)	1	Gasket
43	23208 (3200)	4	Washer
44	69588 (3200)	1	Cover, power supply

NOTES:

Power Supply (Sheet 2 of 2)

Figure 5-11. Power Supply (Sheet 2 of 2)

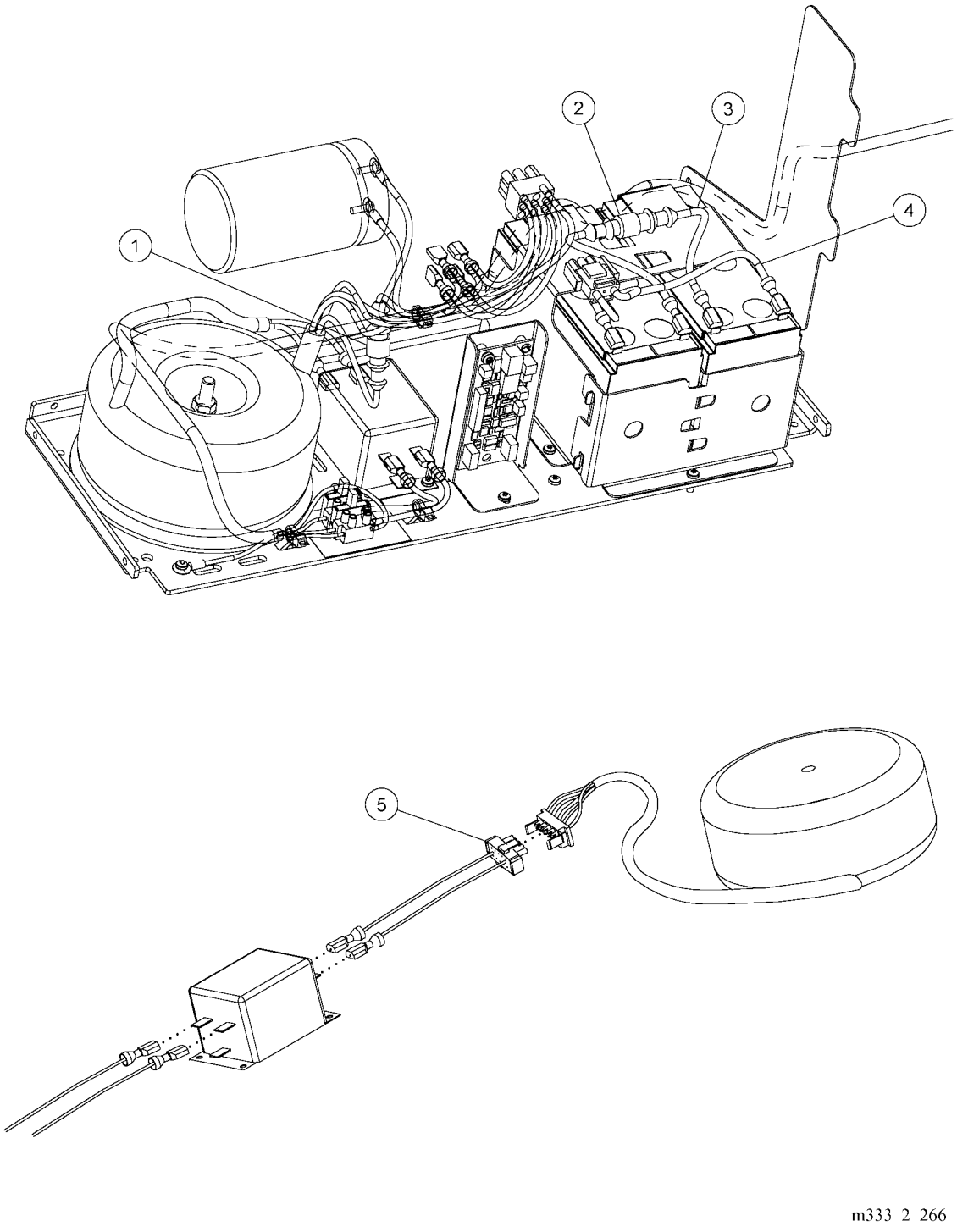

Table 5-11. Power Supply (Sheet 2 of 2)

Item Number	Part Number	Quantity	Description
1	4302338 (3200)	1	Fuse, 20 A
2	7061201 (3200)	1	Fuse, 15 A
3	69458 (3200)	1	Cable assembly, battery fuse
4	69461 (3200)	1	Cable assembly, battery power
5	134060 (3200)	1	Cable assembly, transformer adapter, 100 V
	134061 (3200)		Cable assembly, transformer adapter, 110 V
	134062 (3200)		Cable assembly, transformer adapter, 115 V
	134063 (3200)		Cable assembly, transformer adapter, 120 V
	134064 (3200)		Cable assembly, transformer adapter, 127 V
	134065 (3200)		Cable assembly, transformer adapter, 220 V
	134066 (3200)		Cable assembly, transformer adapter, 230 V
	134067 (3200)		Cable assembly, transformer adapter, 240 V

Foot Extension

Figure 5-12. Foot Extension

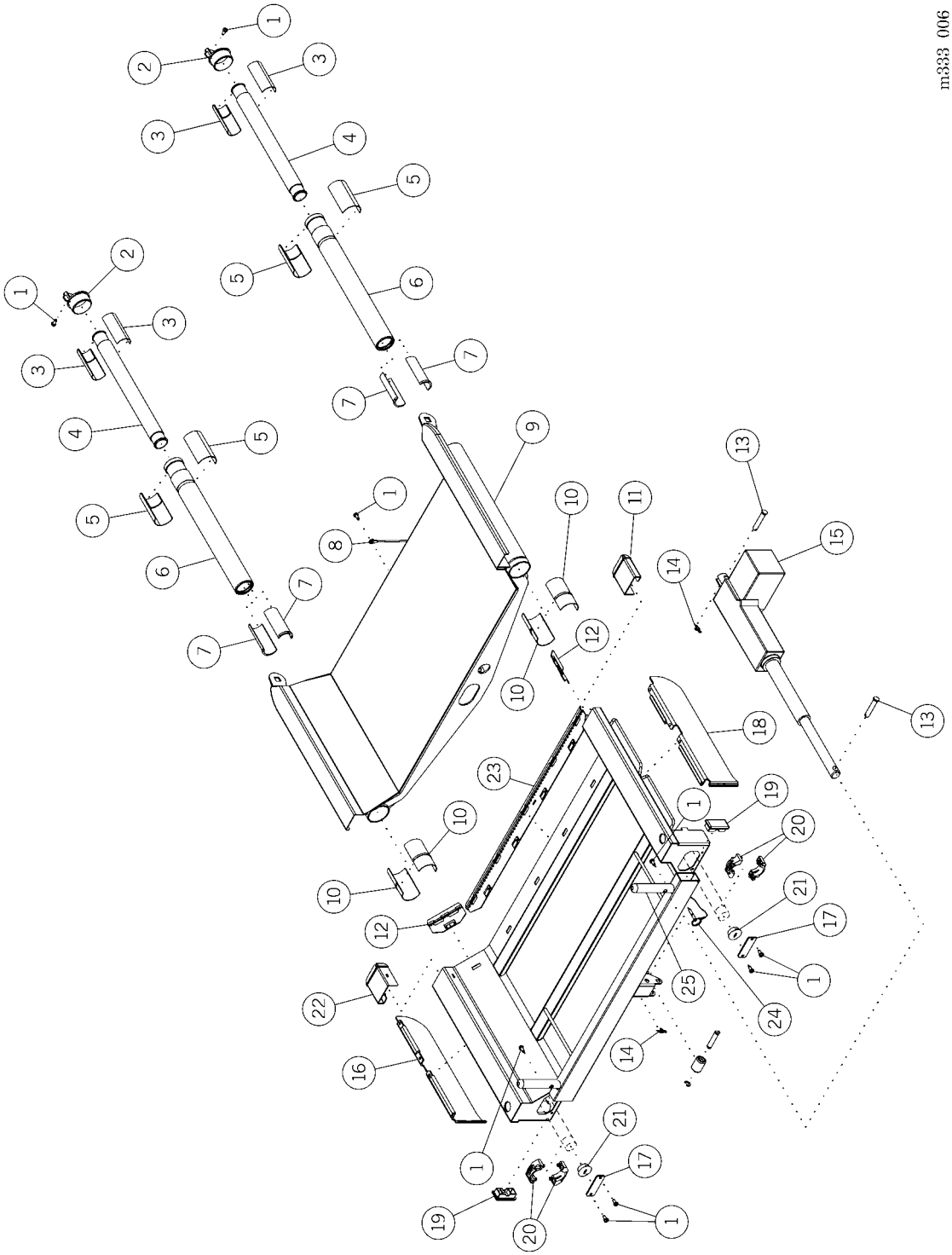

Table 5-12. Foot Extension

Item Number	Part Number	Quantity	Description
1	70341 (3200)	9	Screw
2	69910 (3200)	2	Tube, end cap, fixed, foot
3	47209 (3200)	4	Split bushing, rear, inner, foot
4	47218 (3200)	2	Tube, slide, inner
5	47207 (3200)	4	Split bushing, rear, outer, foot
6	70475(3200)	2	Tube, slide inner
7	47208 (3200)	4	Split bushing, front, inner, side
8	3924018 (3200)	1	Ground wire
9	69635 (3200)	1	Weldment
10	72435 (3200)	4	Split bushing, front, outer side
11	7038101(3200)	1	Wiper, upper, foot section
12	70463 (3200)	2	Wiper, moving foot side
13	70787 (3200)	2	Pin, clevis
14	61615 (3200)	2	Rue ring
15	7000203 (3200)	1	Drive, foot extension
16	7015402 (3200)	1	Cover, foot assembly tube, rh
17	69639 (3200)	2	Retainer bar, foot slide
18	7015401 (3200)	1	Cover, foot assembly tube, lh
19	4917702 (3200)	2	Plug, frame tube
20	69917 (3200)	4	Terminator, foot side
21	71270 (3200)	2	Hole plug
22	7038102 (3200)	1	Wiper, upper, foot section
23	70785 (3200)	1	wiper, long
24	66733 (3200)	1	Chain
25	69638 (3200)	2	Footboard post

Air Compressor

Figure 5-13. Air Compressor

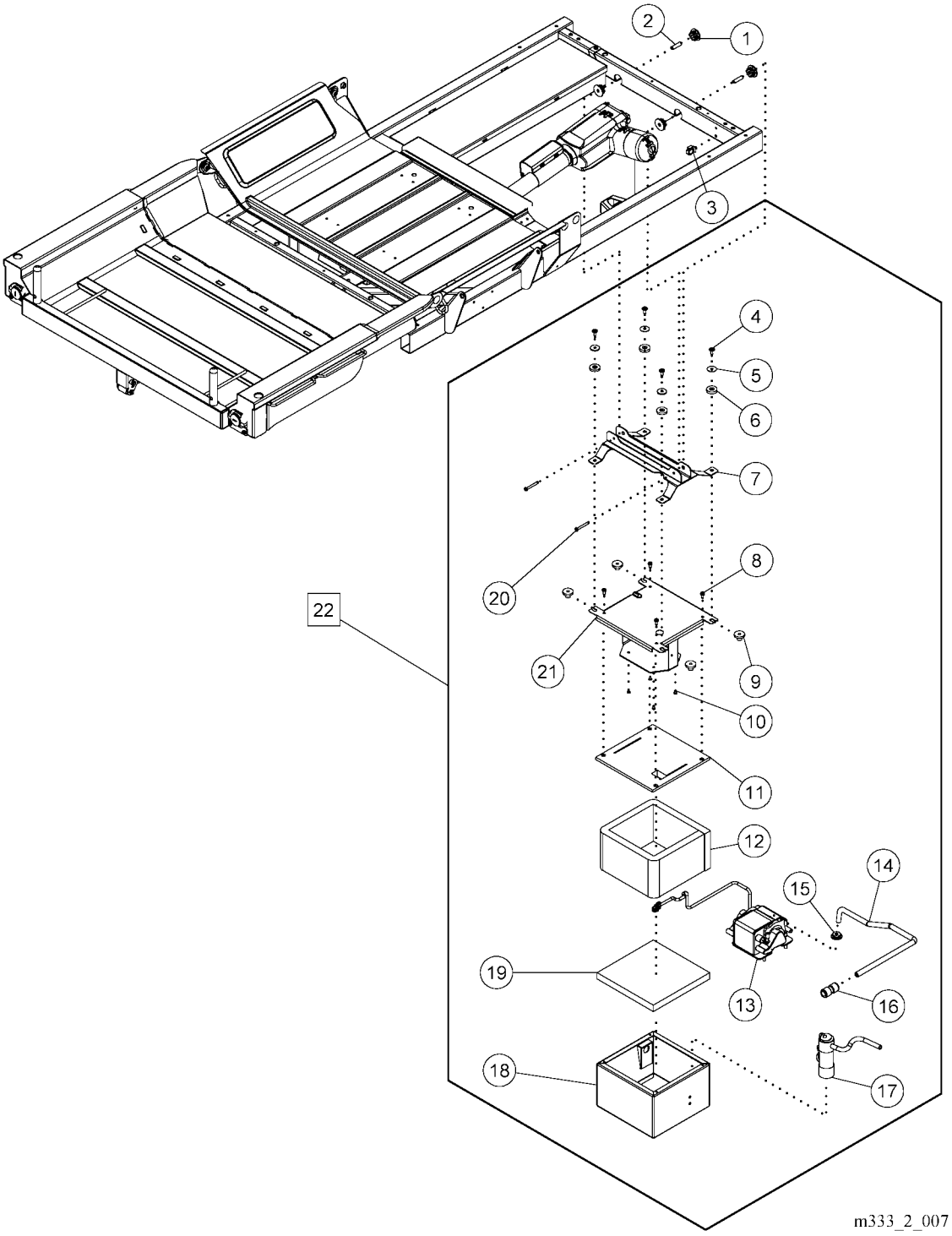

Table 5-13. Air Compressor

Item Number	Part Number	Quantity	Description
1	72230 (3200)	4	Grommet, isolator
2	72232 (3200)	2	Spacer, round
3	70133 (3200)	1	Clamp, plastic
4	70882 (3200)	4	Screw
5	3869 (3200)	4	Washer
6	72549 (3200)	4	Washer, rubber
7	72462 (3200)	1	Weldment, pump, bracket
8	70341 (3200)	4	Screw
9	69962 (3200)	4	Mount, isolation
10	70350 (3200)	4	Screw
11	69960 (3200)	1	Foam, top, pump box
12	69957 (3200)	1	Foam, side, pump box
13	69934 (3200)	1	Pump
14	70102 (3200)	1	Hose, urethane
15	70881 (3200)	1	Grommet, hose
16	70031 (3200)	1	Union
17	70104 (3200)	1	Muffler
18	70001 (3200)	1	Weldment, pump, box
19	69959 (3200)	1	Foam pump box
20	69990 (3200)	2	Screw
21	70171 (3200)	1	Lid
22	69999 (3200)	1	Pump assembly, air

Air Module

Figure 5-14. Air Module

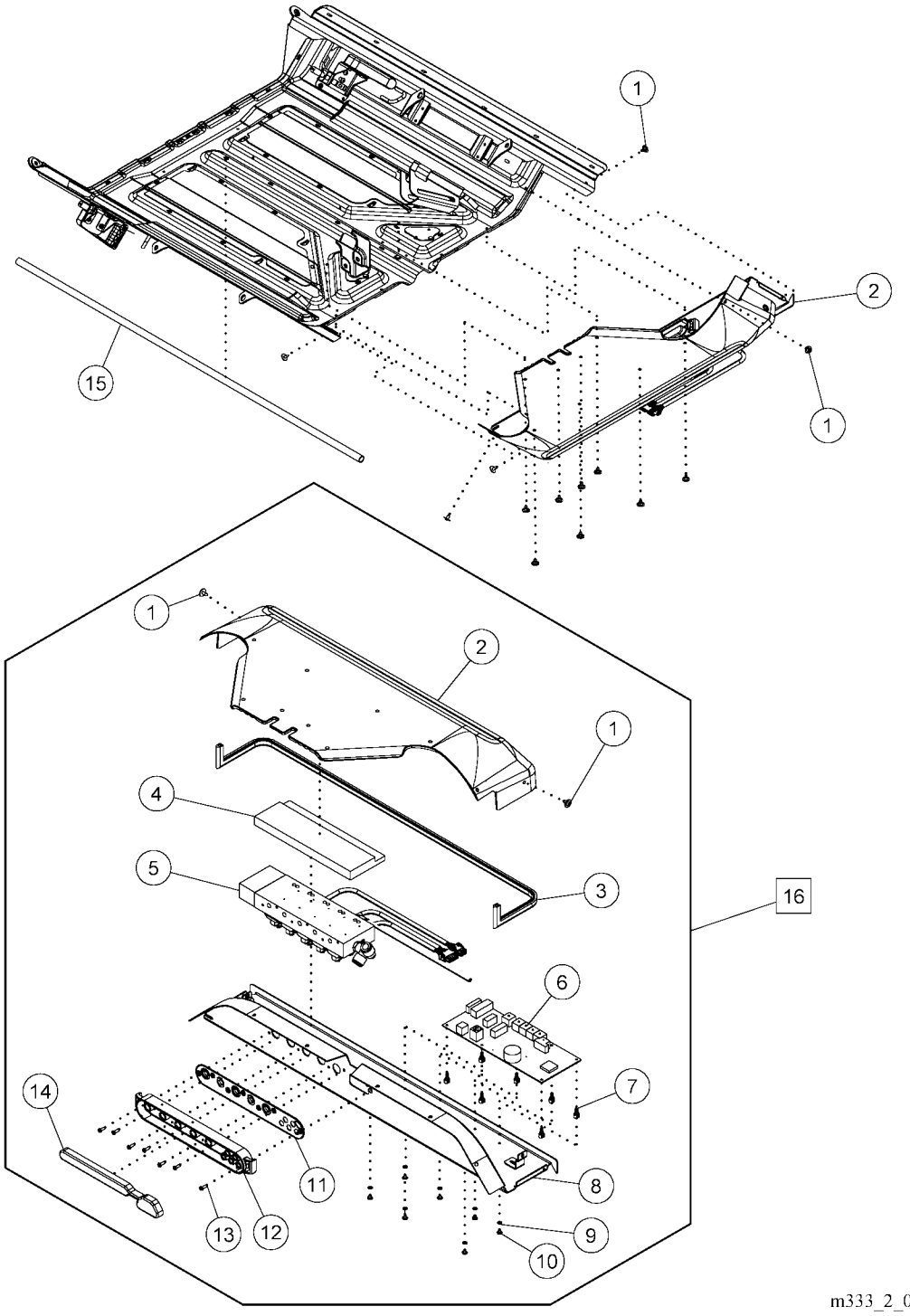

Table 5-14. Air Module

Item Number	Part Number	Quantity	Description
1	71993 (3200)	14	Screw
2	69977 (3200)	1	Cover, head deck air box
3	69996 (3200)	1	Gasket, head deck air box
4	69984 (3200)	1	Foam diffuser
5	69937 (3200)	1	Air manifold
6	72295 (3200)	1	P.C. board air control
7	69953 (3200)	7	Standoff, rivet, snap
8	70840 (3200)	1	Weldment, head deck air box
9	71012 (3200)	7	Washer, neoprene
10	70064 (3200)	7	Rivet
11	69943 (3200)	1	Gasket, air manifold
12	69941 (3200)	1	Connector
13	69988 (3200)	7	Screw
14	71011 (3200)	1	Cover, shipping
15	69947 (3200)	1	Hose
16	127895 (3200)	1	Manifold assembly, air

Footboard

Figure 5-15. Footboard

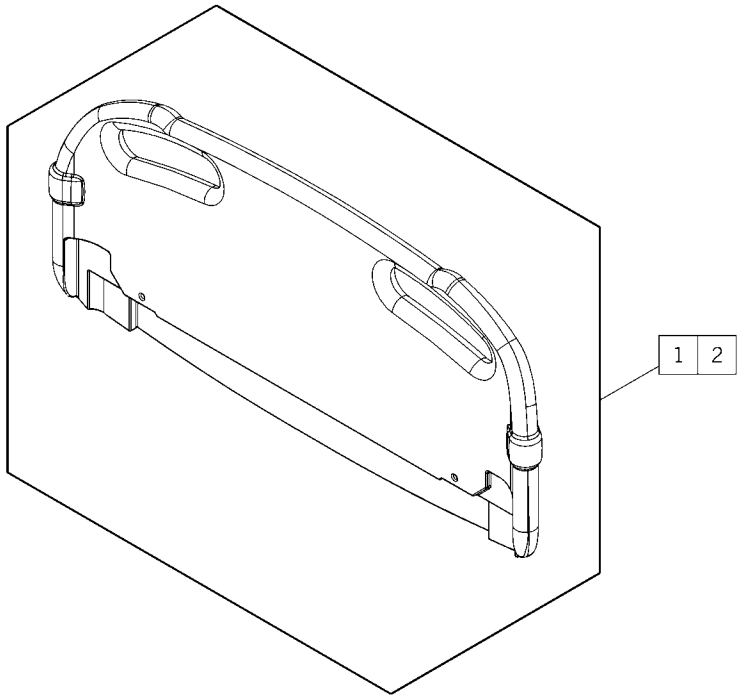

Table 5-15. Footboard

Item Number	Part Number	Quantity	Description
1	127490 (3200)	1	Footboard (capital beds only)
2	127491 (3200)	1	Footboard (rental beds only)

Headboard

Figure 5-16. Headboard

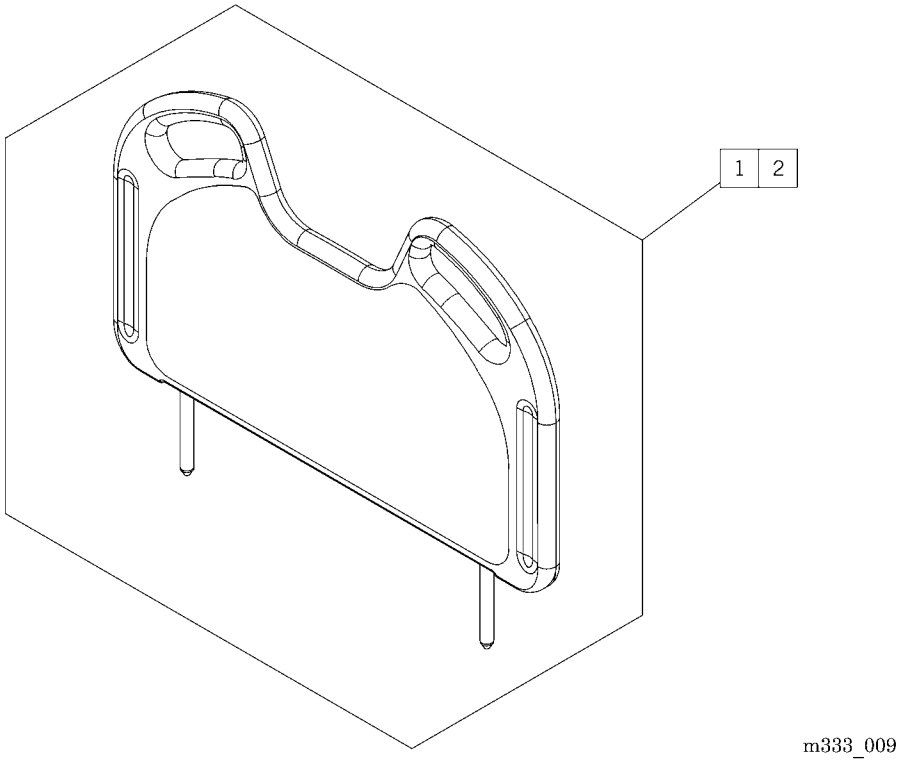

Table 5-16. Headboard

Item Number	Part Number	Quantity	Description
1	127488 (3200)	1	Headboard (capital beds only)
2	127489 (3200)	1	Headboard (rental beds only)

Sensor Strips

Figure 5-17. Sensor Strips

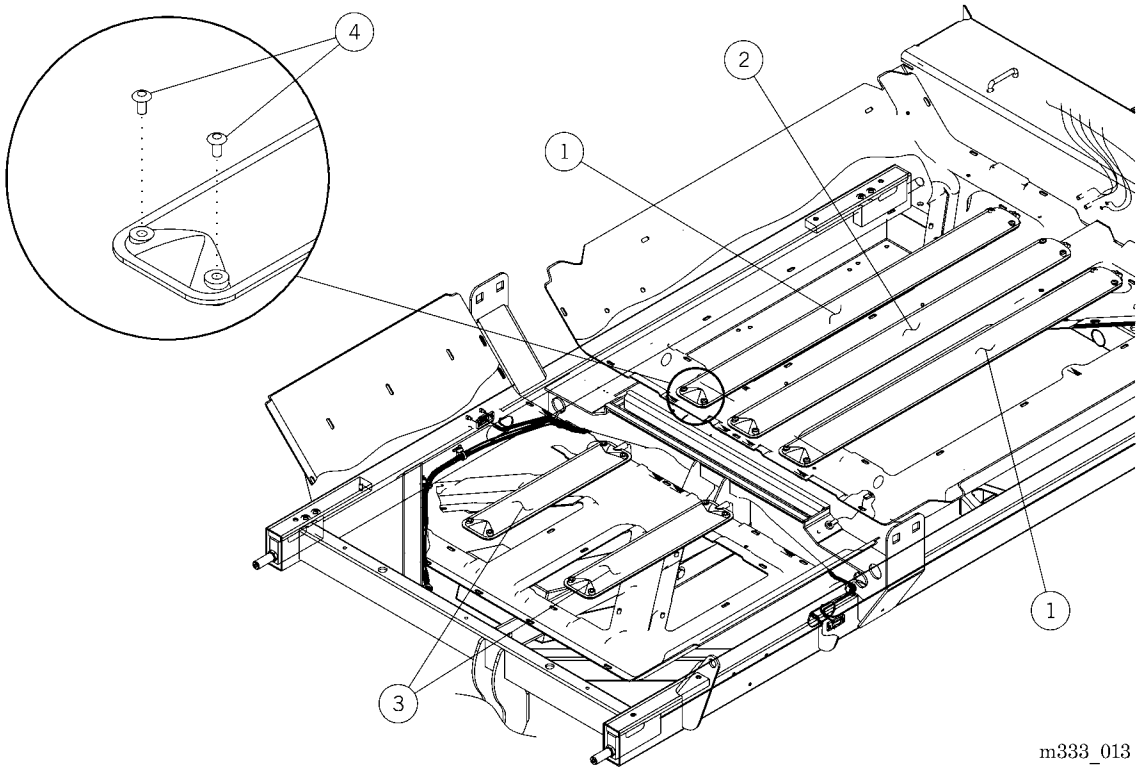

Table 5-17. Sensor Strips

Item Number	Part Number	Quantity	Description
1	71051 (3200)	2	Air, head sensor strip
2	7074901 (3200)	1	PPM sensor, head
3	7074902 (3200)	2	PPM sensor, seat
4	72506 (3200)	20	Rivet, drive

NOTES:

Sleep Deck

Figure 5-18. Sleep Deck

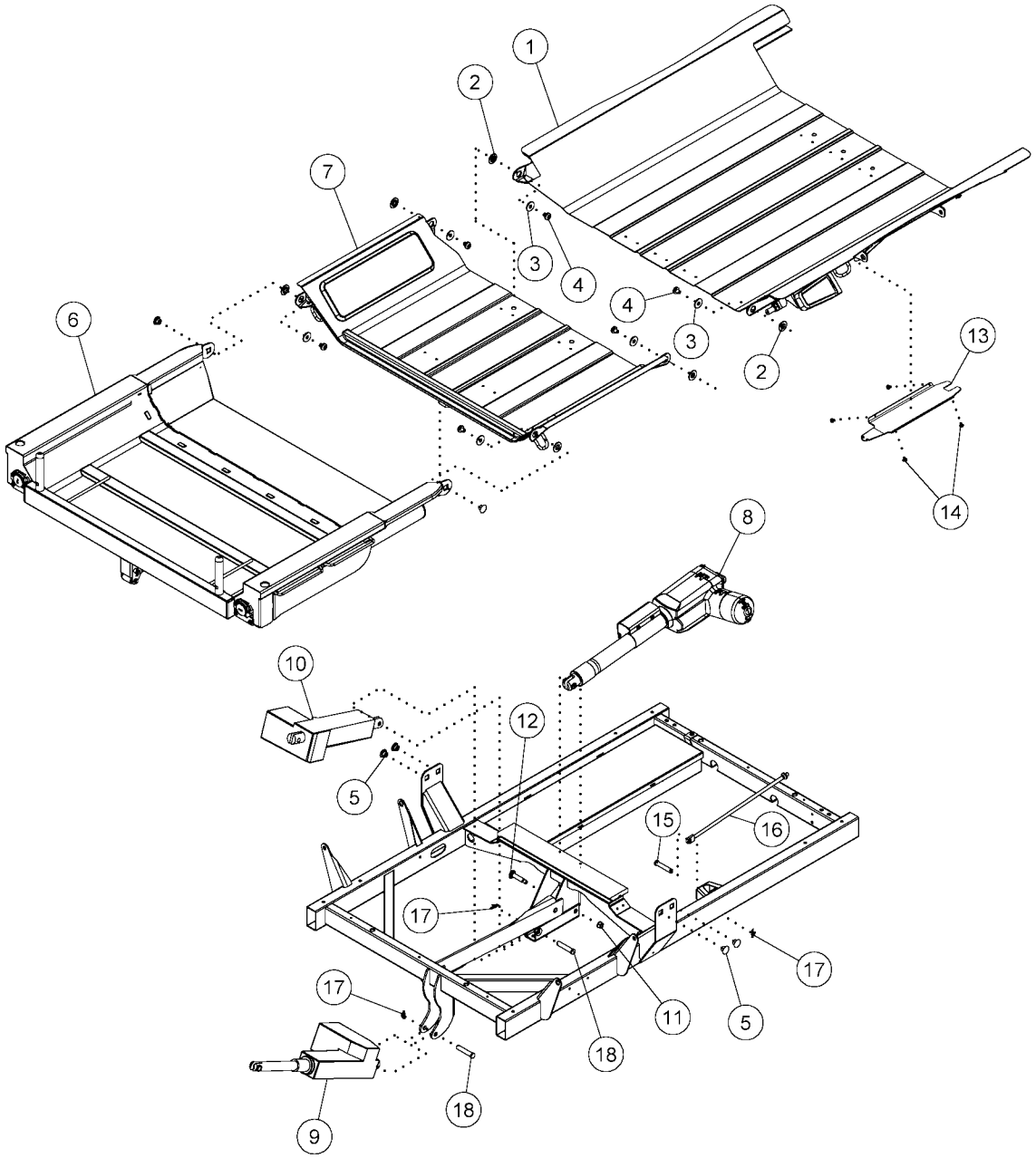

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Table 5-18. Sleep Deck

Item Number	Part Number	Quantity	Description
1	69649 (3200)	1	Weldment, head deck
2	44092 (3200)	6	Bushing
3	70222 (3200)	6	Washer
4	69966 (3200)	6	Screw
5	69643 (3200)	6	Nut
6	69956 (3200)	1	Retracting foot section assembly
7	69655 (3200)	1	Weldment, seat deck
8	6997201 (3200)	1	Head drive
9	7000202 (3200)	1	Leg drive
10	7000201 (3200)	1	Knee drive
11	132847 (3200)	6	Nut
12	70383	1	Bolt
13	69680	1	Cover, wire, head deck
14	71993	4	Screw
15	6314306	1	Pin
16	69969	1	Dampener, head deck
17	61615	1	Rue ring
18	70787	2	Pin, clevis

IntelliDrive® Transport System

Figure 5-19. IntelliDrive® Transport System

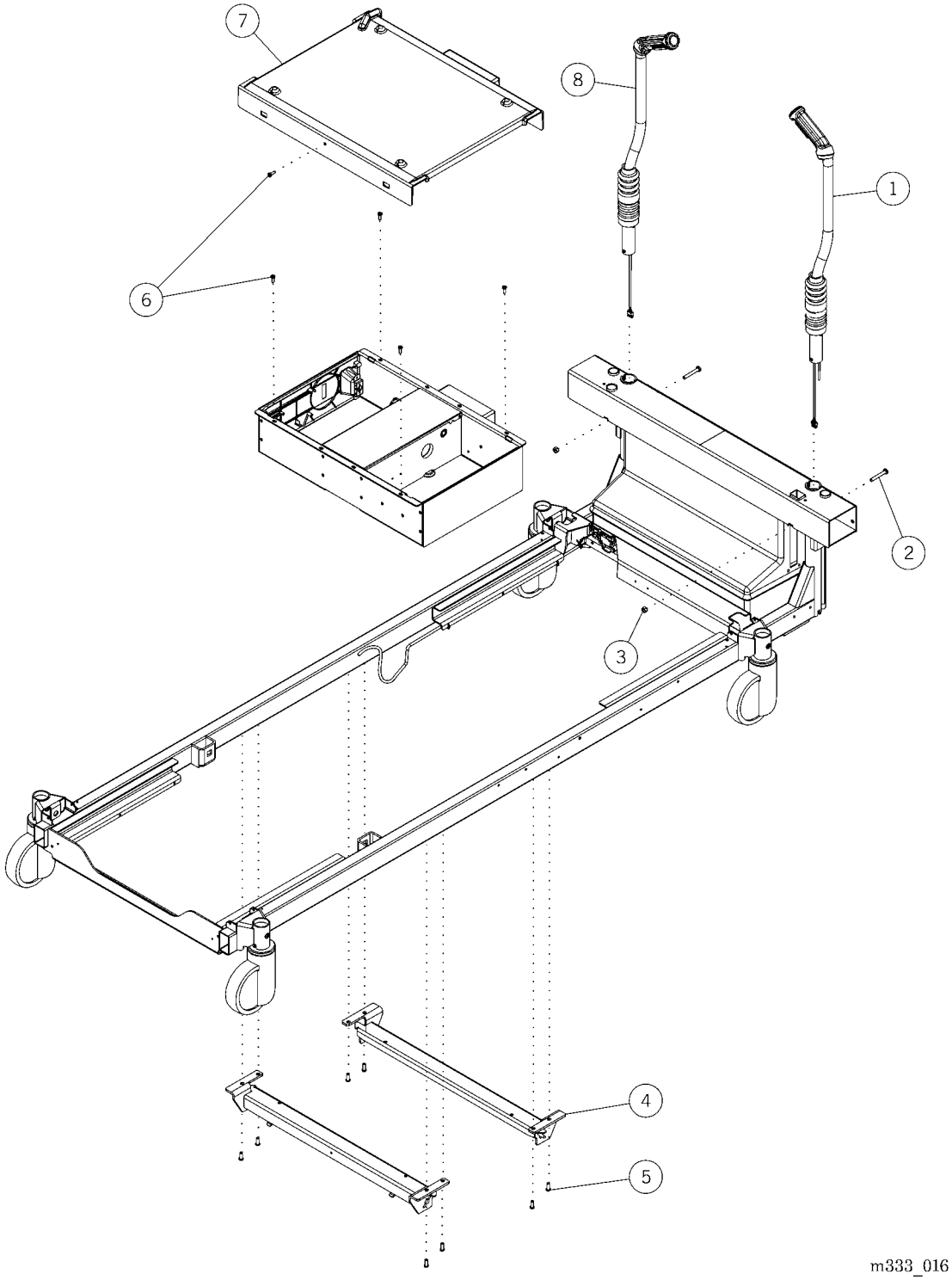


Table 5-19. IntelliDrive® Transport System

Item Number	Part Number	Quantity	Description
1	7006601 (3200)	1	Push handle assembly, lh
2	9001828 (3200)	2	Screw
3	4435 (3200)	2	Nut
4	69734 (3200)	2	Weldment, mounting bracket
5	70762 (3200)	8	Screw
6	69077 (3200)	5	Screw
7	70050 (3200)	1	Cover
8	7006602 (3200)	1	Push handle assembly, rh

IntelliDrive® Transport System—Drive Box

Figure 5-20. IntelliDrive® Transport System—Drive Box

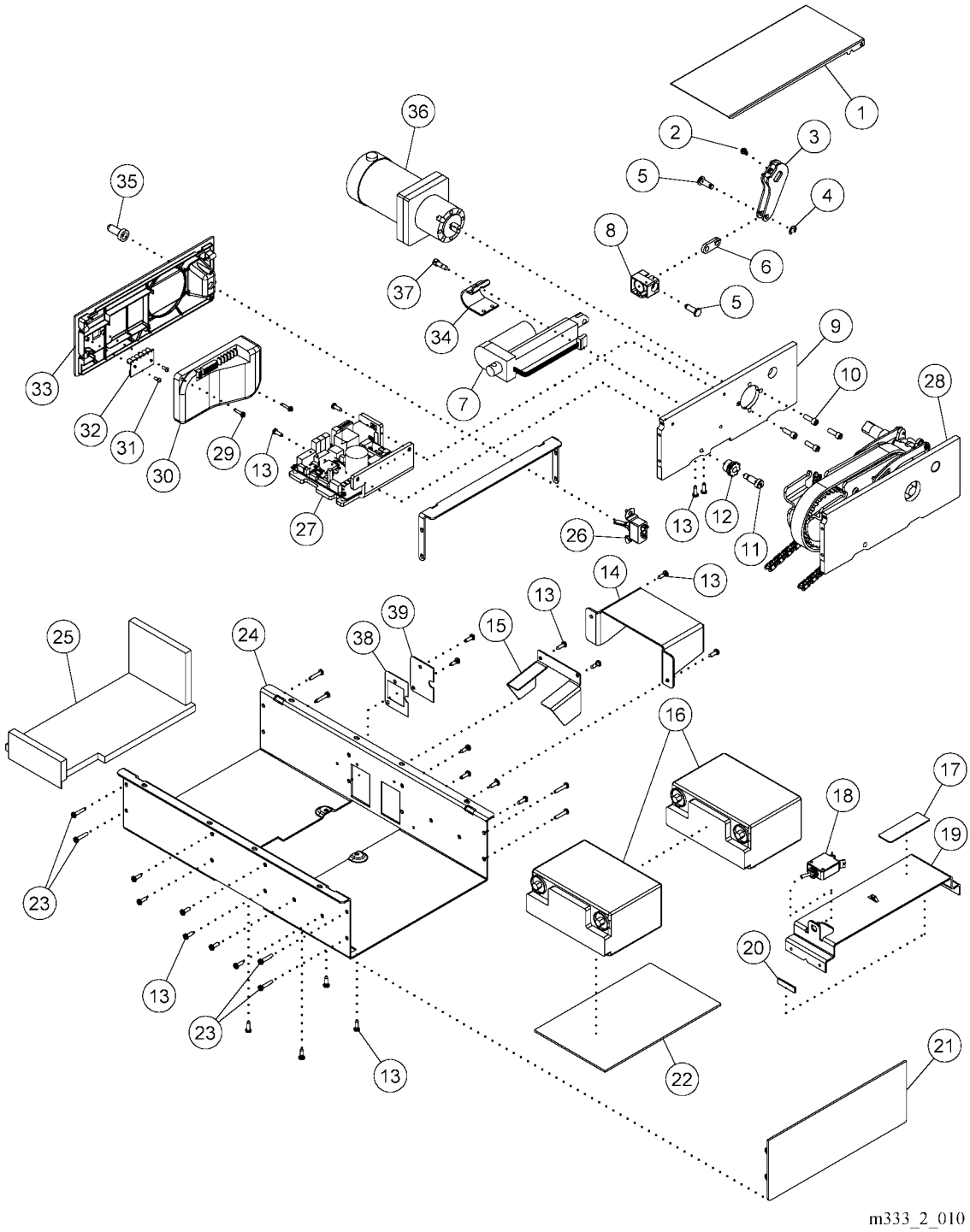


Table 5-20. IntelliDrive® Transport System—Drive Box

Item Number	Part Number	Quantity	Description
1	70468 (3200)	1	Cover, drive mechanism
2	70342 (3200)	1	Screw
3	70411 (3200)	1	Weldment, lever, linear actuator
4	35325 (3200)	1	E-ring
5	35306 (3200)	4	Hinge pin
6	128983 (3200)	1	Link
7	69739 (3200)	1	Linear actuator
8	70052 (3200)	1	Guide, linear actuator
9	128990 (3200)	1	Motor mount, assembly
10	43728 (3200)	5	Screw
11	69824 (3200)	2	Screw
12	68306 (3200)	2	Sprocket
13	69077 (3200)	27	Screw
14	128987 (3200)	1	Spring hood
15	70470 (3200)	1	Spring guide
16	68308 (3200)	2	Battery, 12 V
17	302252 (3200)	1	Label
18	68295 (3200)	1	Circuit breaker
19	69196 (3200)	1	Bracket, battery retainer
20	69354 (3200)	1	Foam, battery retainer
21	69931 (3200)	1	End plate
22	68869 (3200)	1	Pad, battery
23	42140 (3200)	8	Screw
24	128984 (3200)	1	Pan
25	68865 (3200)	1	Sound reducing kit
26	70097 (3200)	1	Switch
27	70246 (3200)	1	PACM P.C. board
28	128985 (3200)	1	Plate
29	49508 (3200)	2	Screw
30	68307 (3200)	1	Motor controller
31	42414 (3200)	4	Screw

Item Number	Part Number	Quantity	Description
32	72300 (3200)	1	Battery indicator
33	69932 (3200)	1	End plate, motor side
34	70467 (3200)	1	Strap, mounting linear actuator
35	72135 (3200)	1	Boot, toggle switch
36	71529 (3200)	1	Motor gear
37	43728 (3200)	5	Screw
38	128991 (3200)	1	Gasket, actuator lever
39	128988 (3200)	1	Cover, actuator lever
40 (not shown)	68333S (3200)	1	Powered transport drive assembly

NOTES:

IntelliDrive® Transport System—Drive Belt

Figure 5-21. IntelliDrive® Transport System—Drive Belt

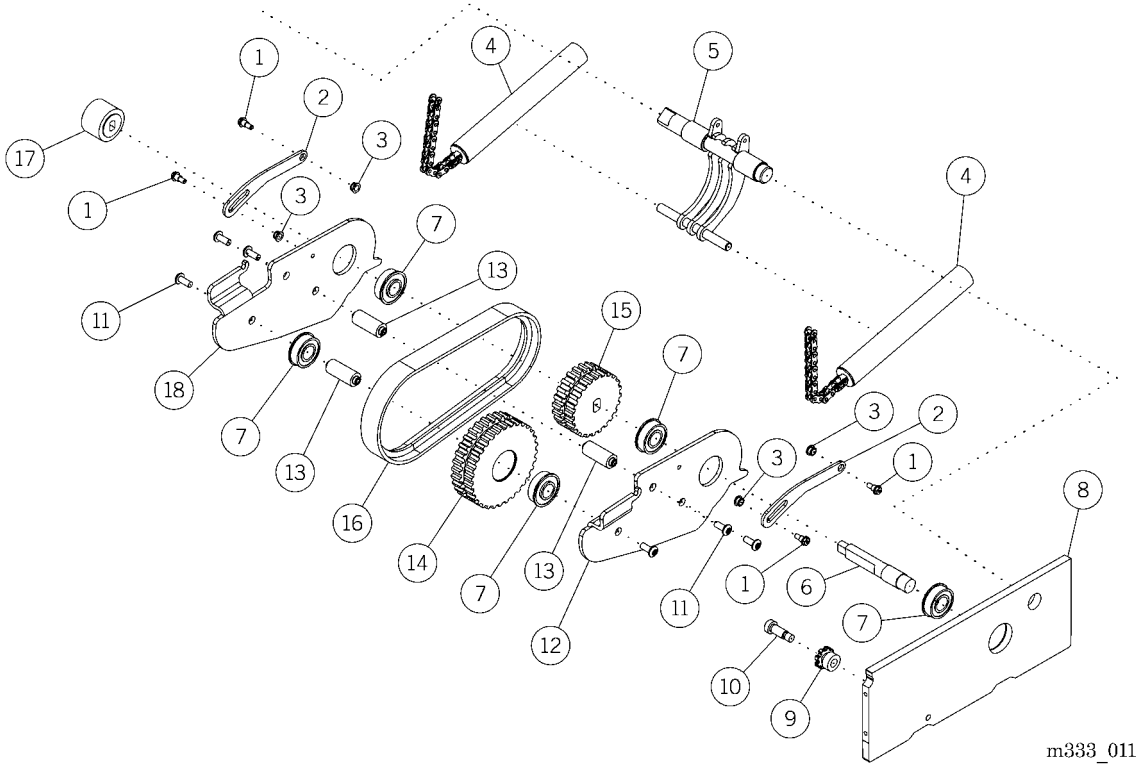


Table 5-21. IntelliDrive® Transport System—Drive Belt

Item Number	Part Number	Quantity	Description
1	68809 (3200)	4	Screw
2	70636 (3200)	2	Return link
3	68808 (3200)	4	Bearing
4	69751 (3200)	2	Spring/chain assembly
5	6974302 (3200)	1	Weldment
6	68291 (3200)	1	Drive shaft
7	68284 (3200)	5	Bearing
8	69738 (3200)	1	Plate
9	68306 (3200)	2	Sprocket
10	69824 (3200)	2	Screw
11	49521 (3200)	6	Screw
12	6974501 (3200)	1	Pulley side plate, lh

Item Number	Part Number	Quantity	Description
13	68290 (3200)	6	Shaft, drive pulley
14	68287 (3200)	1	Pulley, 32 teeth
15	68286 (3200)	1	Pulley, 24 teeth
16	68285 (3200)	1	Belt
17	68292 (3200)	1	Coupling drive
18	6974502 (3200)	1	Pulley side plate, rh

Treatment Surface (P3251EA)

Figure 5-22. Treatment Surface (P3251EA)

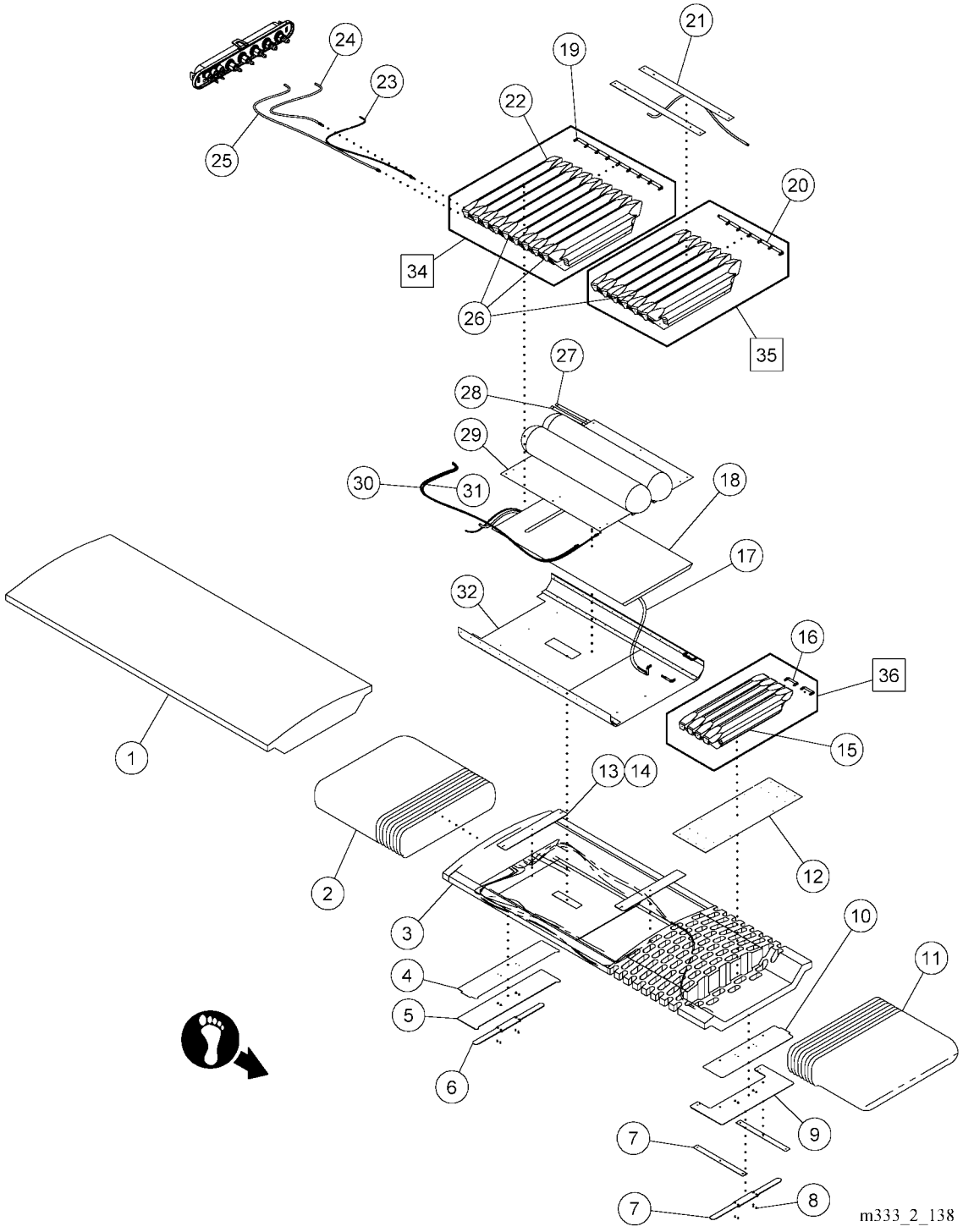


Table 5-22. Treatment Surface (P3251EA)

Item Number	Part Number	Quantity	Description
1	100-005-0689 (3200)	1	Ticking
2	100-013-0002 (3200)	1	Shear liner
3	070-001-0134 (3200)	1	Foam bucket assembly
4	100-007-0072 (3200)	1	Tape, anchor plate, head end
5	150-001-0046 (3200)	1	Plate, anchor head
6	150-001-0044 (3200)	2	Strip, anchor
7	100-005-0687 (3200)	2	Pattern, attachment strap, foot
8	001-033-0111 (3200)	8	Screw
9	150-001-0045 (3200)	1	Plate, foot anchor
10	100-007-0073 (3200)	1	Tape, anchor plate, foot
11	100-010-0006 (3200)	1	Fire barrier, fabric
12	100-005-0688 (3200)	1	Pattern, substrate
13	150-001-0050 (3200)	2	Plate, anchor
14	100-007-0077 (3200)	2	Tape
15	100-004-0239 (3200)	4	Bladder, cushion foot
16	150-005-0247 (3200)	3	Connector tube, foot assembly
17	150-005-0246 (3200)	1	Foot fill/sensor tube assembly (clear)

Item Number	Part Number	Quantity	Description
18	070-001-0135 (3200)	1	Head/seat filler foam assembly
19	150-005-0242 (3200)	1	Head connector tube assembly
20	150-005-0244 (3200)	1	Seat fill tube assembly (red)
21	100-005-686 (3200)	2	Pattern, attachment strap
22	100-004-0237 (3200)	12	Bladder, cushion, single port
23	150-005-0243 (3200)	1	Head sensor tube assembly (white)
24	150-005-0241 (3200)	1	Head fill tube assembly (white)
25	150-005-0245 (3200)	1	Seat sensor tube assembly (red)
26	100-004-0238 (3200)	3	Bladder, cushion, dual port
27	150-005-0256 (3200)	1	Right turn assist fill tube, assembly (yellow)
28	150-005-0248 (3200)	1	Left turn assist fill tube assembly (green)
29	100-004-0236 (3200)	1	Bladder, cushion, turn assist
30	150-005-0257 (3200)	1	Left turn assist sensor tube assembly (green)
31	150-005-0249 (3200)	1	Right turn assist sensor tube assembly (yellow)
32	100-005-0684 (3200)	1	Substrate, cushion mounting assembly
33	150-006-0034 (3200)	1	Interface connector assembly
34	129668 (3200)	1	Head section bladder assembly
35	129669 (3200)	1	Seat section bladder assembly
36	129670 (3200)	1	Foot section bladder assembly

NOTES:

Short Stay Surface (P3250EA)

Figure 5-23. Short Stay Surface (P3250EA)

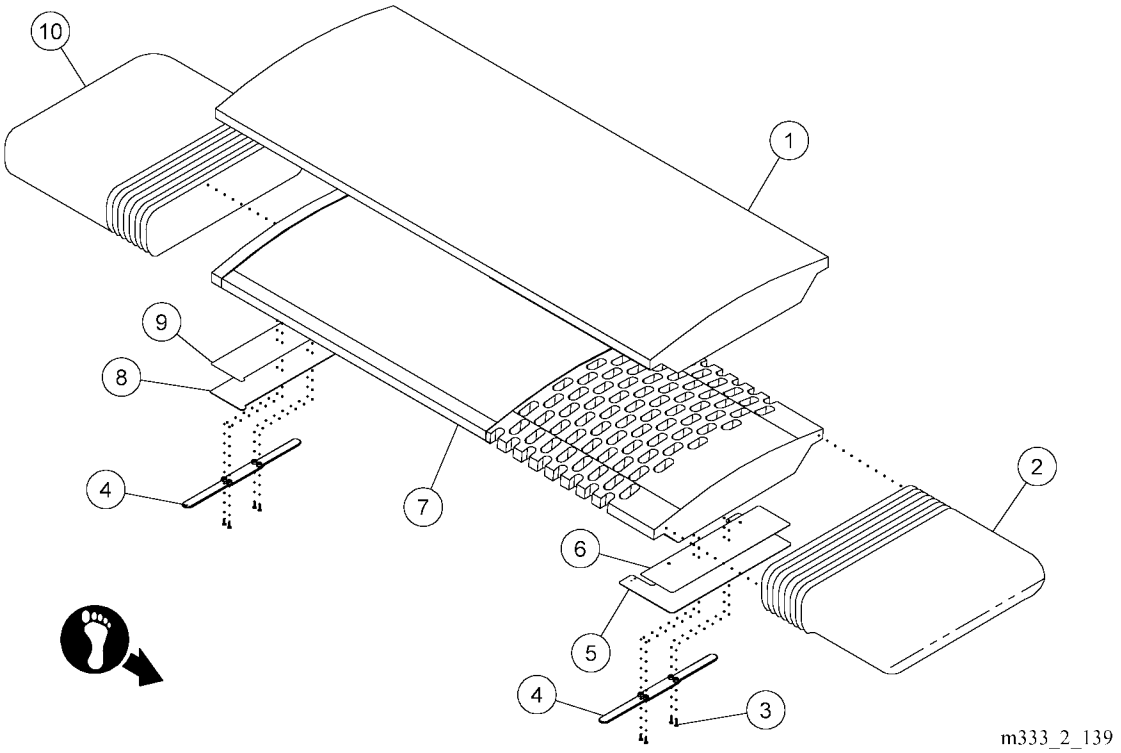


Table 5-23. Short Stay Surface (P3250EA)

Item Number	Part Number	Quantity	Description
1	100-005-0535 (3200)	1	Ticking assembly
2	100-010-0006 (3200)	1	Fire barrier
3	001-033-0111 (3200)	8	Screw
4	150-001-0044 (3200)	2	Strip, anchor
5	150-001-0045 (3200)	1	Plate, anchor, foot
6	100-007-0073 (3200)	1	Tape, anchor plate, foot

Item Number	Part Number	Quantity	Description
7	070-001-0103 (3200)	1	Foam
8	150-001-0046 (3200)	1	Plate, anchor, head
9	100-007-0072 (3200)	1	Tape, anchor plate, head
10	100-013-0002 (3200)	1	Shear liner

Permanent IV Pole

Figure 5-24. Permanent IV Pole

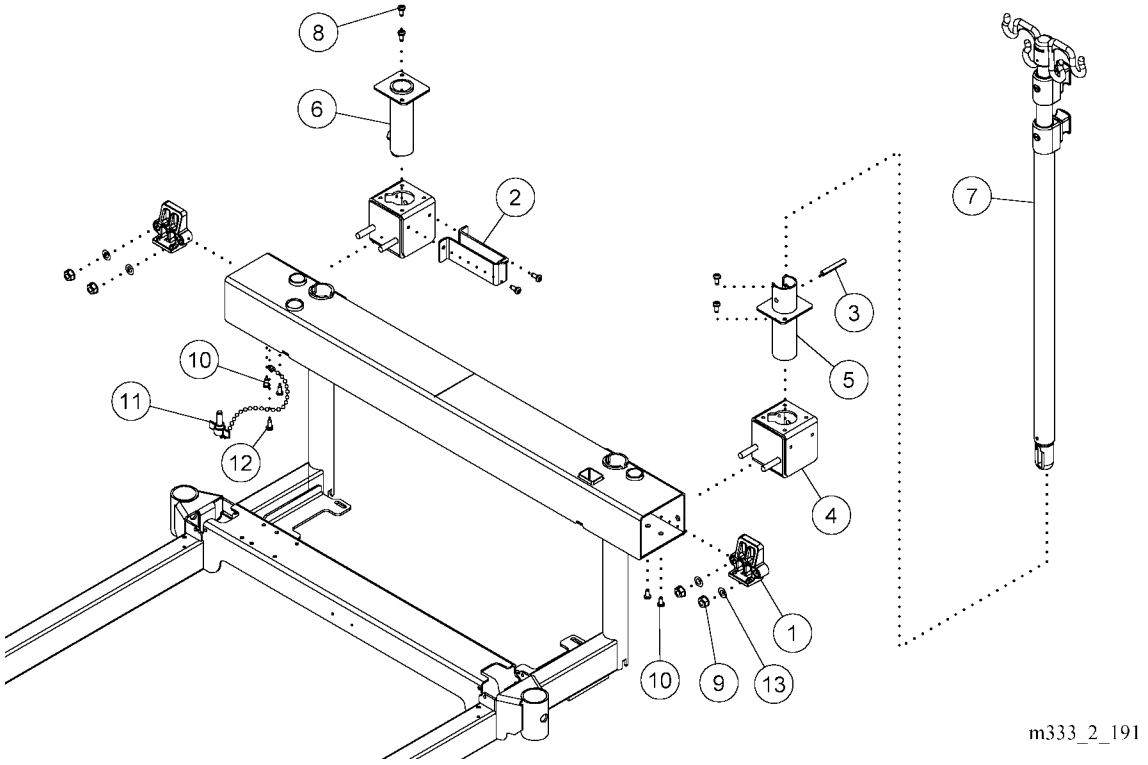


Table 5-24. Permanent IV Pole

Item Number	Part Number	Quantity	Description
1	71623 (3200)	2	Bracket
2	72220 (3200)	1	IV hook rest
3	4604601 (3200)	1	Pin
4	72219 (3200)	2	Weldment, IV support
5	71651 (3200)	1	Weldment, IV Pole mount
6	72323 (3200)	1	Weldment, ISS socket
7	126378 (3200)	1	Permanent IV Pole assembly
8	70341 (3200)	6	Screw
9	70428 (3200)	4	Nut
10	70342 (3200)	4	Screw
11	38129 (3200)	1	Chain and knob assembly

Item Number	Part Number	Quantity	Description
12	18252 (3200)	1	Screw
13	127357 (3200)	4	Washer

Labels (Sheet 1 of 2)

Figure 5-25. Labels (Sheet 1 of 2)

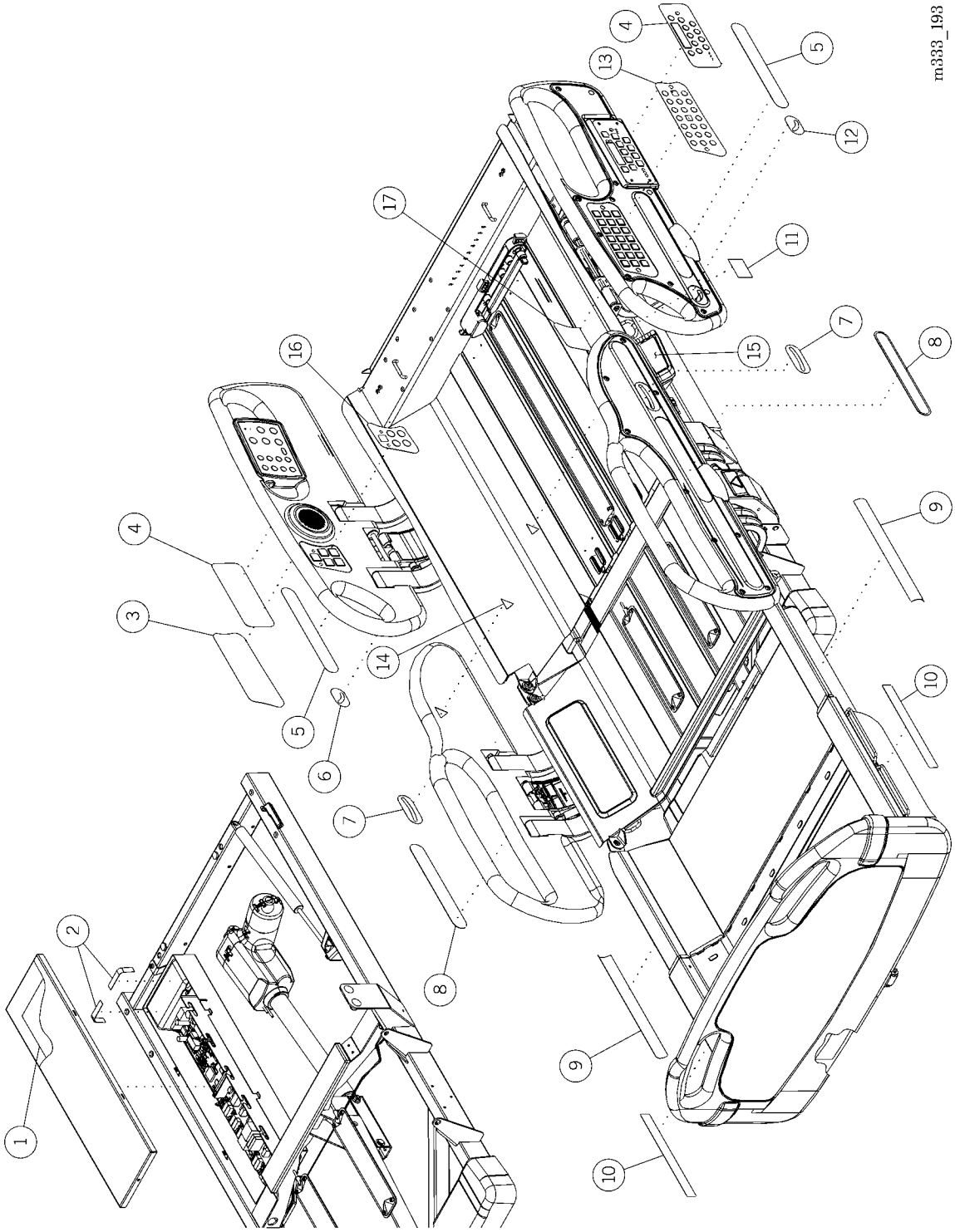


Table 5-25. Labels (Sheet 1 of 2)

Item Number	Part Number	Quantity	Description
1	70944 (3200)	1	Label, logic diagnostic code
2	71046 (3200)	2	Label, seal, (OIML scale beds only)
3	6982502 (3200)	1	Label, siderail, with Nurse Call, rh
	6982602 (3200)	1	Label, siderail, without Nurse Call, rh
4	7087601 (3200)	1	Label, pod, scale only
	7087602 (3200)	1	Label, pod, scale and PPM
	7087603 (3200)	1	Label, pod, scale, PPM and air
	7087604 (3200)	1	Label, pod, PPM only
	7087605 (3200)	1	Label, pod, air only
	7087606 (3200)	1	Label, pod, air, scale
	7087607 (3200)	1	Label, pod, air, PPM
	7087608 (3200)	1	Label, pod, scale (European only)
	7087609 (3200)	1	Label, pod, scale, air (European only)
5	7082502 (3200)	1	Label, siderail warning and scale instructions—English
	7082501 (3200)	1	Label, siderail warning—English
	70825202 (3200)	1	Label, siderail warning and scale instructions—German
	70825302 (3200)	1	Label, siderail warning and scale instructions—French
	70825402 (3200)	1	Label, siderail warning and scale instructions—Spanish
	70825502 (3200)	1	Label, siderail warning and scale instructions—Portuguese
	70825602 (3200)	1	Label, siderail warning and scale instructions—Italian
	70825702 (3200)	1	Label, siderail warning and scale instructions—Dutch
	70825802 (3200)	1	Label, siderail warning and scale instructions—Swedish
	70825201 (3200)	1	Label, siderail warning—German

Item Number	Part Number	Quantity	Description
5	70825301 (3200)	1	Label, siderail warning—French
	70825401 (3200)	1	Label, siderail warning—Spanish
	70825501 (3200)	1	Label, siderail warning—Portuguese
	70825601 (3200)	1	Label, siderail warning—Italian
	70825701 (3200)	1	Label, siderail warning—Dutch
	70825801 (3200)	1	Label, siderail warning—Swedish
6	7081602 (3200)	1	Label, head elevation, rh
7	69814 (3200)	1	Label, Trendelenburg
8	70810 (3200)	1	Label, Hill-Rom logo
9	70808 (3200)	1	Label, foot extend
10	70799 (3200)	1	Label, heel relief zone (air beds only)
11	70802 (3200)	1	Label kit (patient restraint)
12	7081601 (3200)	1	Label, head elevation, lh
13	6982501 (3200)	1	Label, siderail, with Nurse Call, lh
	6982601 (3200)	1	Label, siderail, without Nurse Call. lh
14	65262101		Label, hip location—English
	65262201		Label, hip location—German
	65262301		Label, hip location—French
	65262401		Label, hip location—Spanish
	65262501		Label, hip location—Portuguese
	65262601		Label, hip location—Italian
	65262701		Label, hip location—Dutch
	65262801		Label, hip location—Swedish
15	70802 (3200)	1	Label kit (CPR, rh)
		1	Label kit (CPR, lh)

Item Number	Part Number	Quantity	Description
16	6982502 (3200)	1	Label, patient controls, with Nurse Call, rh
	6982602 (3200)	1	Label, patient controls, without Nurse Call, rh
17	6982501 (3200)		Label, patient controls, with Nurse Call, lh
	6982601 (3200)		Label, patient controls, without Nurse Call, lh

Labels (Sheet 2 of 2)

Figure 5-26. Labels (Sheet 2 of 2)

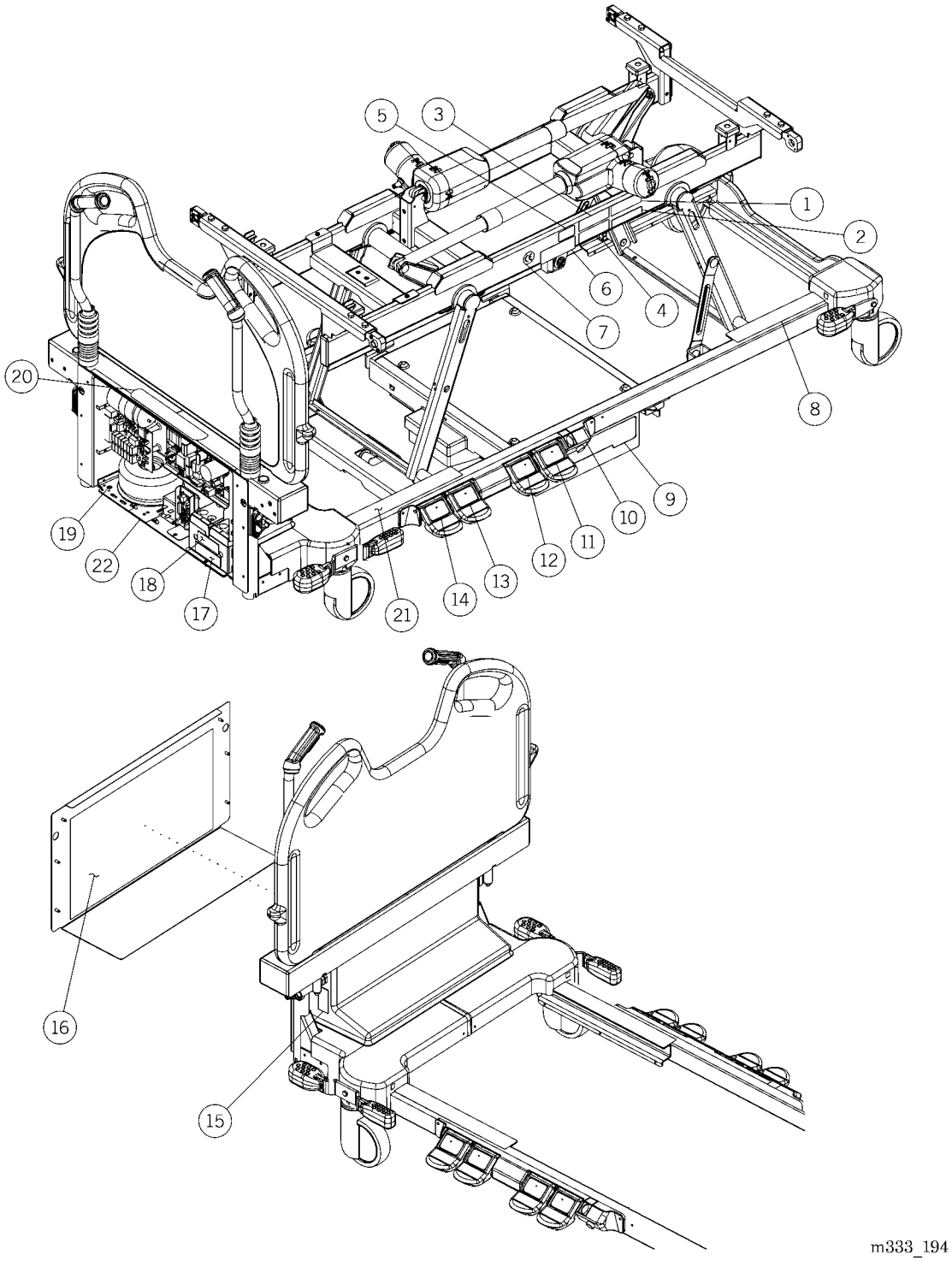


Table 5-26. Labels (Sheet 2 of 2)

Item Number	Part Number	Quantity	Description
1	43163 (3200)	1	Overlay, calibration label
2	70802 (3200)	1	Label kit (patent number label)
3	70814 (3200)	1	Gravity zone (EN beds only)
4	7081502 (3200)	1	EN scale label
5	127951 (3200)	1	Serial number (Rental beds)
6	126930 (3200)	1	Serial number
7	64068 (3200)	1	CE mark (scale beds only)
	46770 (3200)	1	CE mark (no scale)
8	70802 (3200)	1	Label kit (no step, foot end)
9	7081301 (3200)		Label, IntelliDrive® Transport System — English
	7081302 (3200)		Label, IntelliDrive® Transport System — German
	7081303 (3200)		Label, IntelliDrive® Transport System — French
	7081304 (3200)		Label, IntelliDrive® Transport System — Spanish
	7081305 (3200)		Label, IntelliDrive® Transport System — Portuguese
	7081306 (3200)		Label, IntelliDrive® Transport System — Italian
	7081307 (3200)		Label, IntelliDrive® Transport System — Dutch
	7081308 (3200)		Label, IntelliDrive® Transport System — Swedish
10	70802 (3200)	1	Label kit (blank)
11	70898 (3200)	1	Label kit (foot controls, bed down, rh)
	70898 (3200)		Label kit (foot controls, bed down, lh)
12	70898 (3200)		Label kit (foot controls, bed up, rh)
	70898 (3200)		Label kit (foot controls, bed up, lh)
13	70898 (3200)		Label kit (foot controls, head down, rh)
	70898 (3200)		Label kit (foot controls, head down. lh)

Item Number	Part Number	Quantity	Description
14	70898 (3200)		Label kit (foot controls, head up, lh)
	70898 (3200)		Label kit (foot controls, head up, rh)
15	70803 (3200)	1	Label, battery power switch
16	69250 (3200)	1	Wiring schematic
17	30252 (3200)	1	Label
18	66870 (3200)	1	Label, battery warning
19	44002 (3200)	1	Label, protective earth
20	70812 (3200)	1	Label, IntelliDrive® Transport System push handle
21	70802 (3200)	1	Label kit (no step, head end)
22	70801 (3200)	1	Label, fuse block

NOTES:

CPR Cable

Figure 5-27. CPR Cable

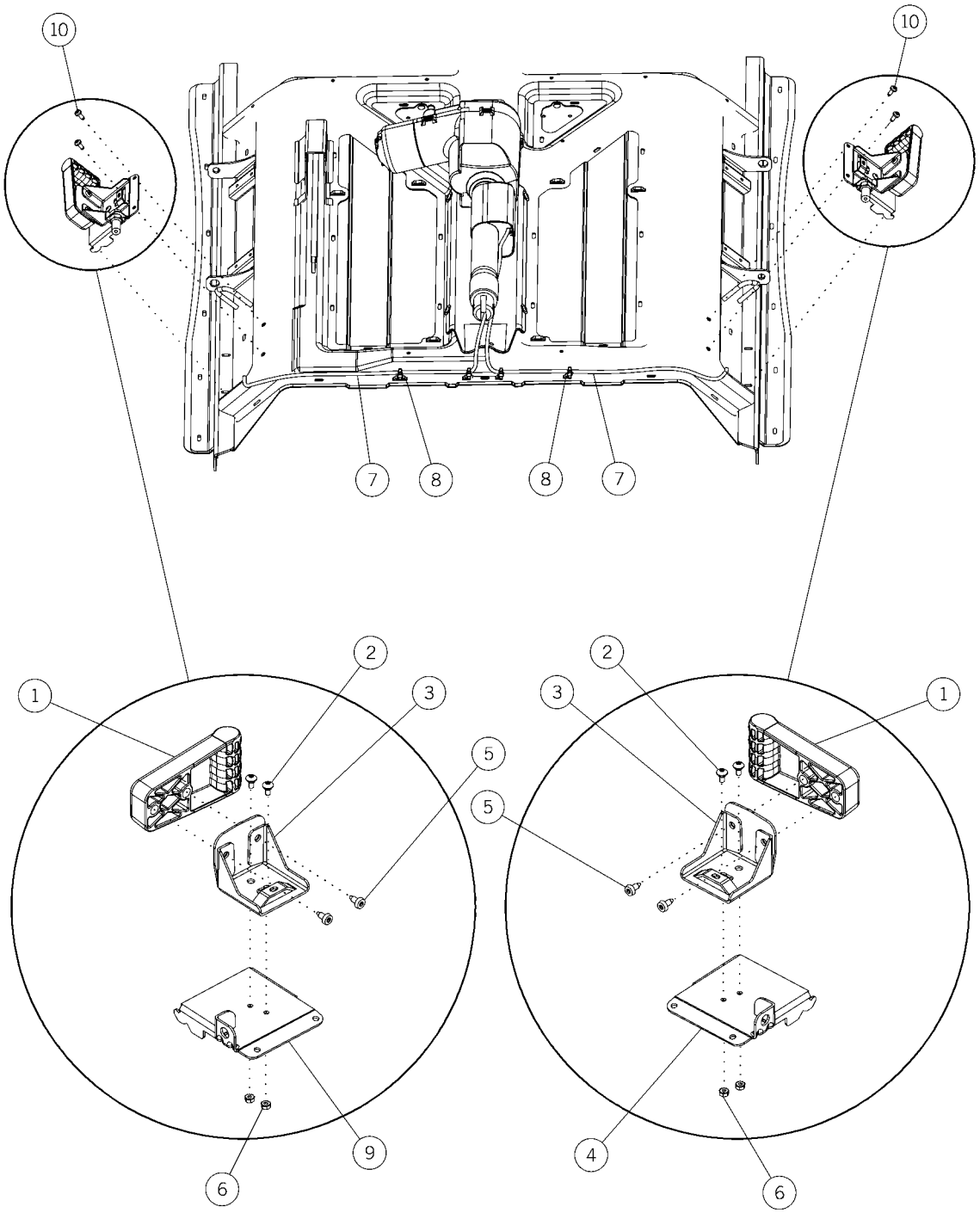


Table 5-27. CPR Cable

Item Number	Part Number	Quantity	Description
1	70412 (3200)	1	Handle
2	69846 (3200)	2	Screw
3	69689 (3200)	1	Pivot bracket
4	6968702 (3200)	1	Base bracket, rh
5	70342 (3200)	2	Screw
6	70398 (3200)	2	Nut
7	69753 (3200)	1	Cable
8	19124 (3200)	2	Cable tie
9	6968701 (3200)	1	Base bracket, lh
10	70341 (3200)	2	Screw

NOTES:

Chapter 6
General Procedures

Cleaning

WARNING:
Follow the product manufacturer's instructions. Failure to do so could result in personal injury or equipment damage.

SHOCK HAZARD:
The potential for electrical shock exists with electrical equipment. Failure to follow facility protocols may result in death or serious injury personal injury.

SHOCK HAZARD:
Unplug the unit from its power source. Failure to do so could result in personal injury or equipment damage.

SHOCK HAZARD:
Do not expose the unit to excessive moisture. Personal injury or equipment damage could occur.

CAUTION:
Do not use harsh cleansers/disinfectants such as scouring pads, heavy duty grease removers, solvents such as toluene, xylene, or acetone. Equipment damage could occur.

General Cleaning

We recommend that you clean the unit with detergent and warm water. Do not use excessive liquid or harsh cleansers such as toluene, xylene, or acetone.

Steam Cleaning

Do not use any steam cleaning device on the unit. Excessive moisture can damage mechanisms in this unit.

Cleaning Hard to Clean Spots

To remove difficult spots or stains, we recommend that you use standard household cleansers and a soft bristle brush. To loosen heavy, dried-on soil, you may first need to saturate the spot.

Disinfecting

When there is visible soilage and also between patient use, we recommend that you disinfect the unit using an EPA registered (US only), tuberculocidal, disinfectant.

Dilute the disinfectant as specified on the manufacturer's label.

Component Handling

CAUTION:
To prevent component damage, make sure your hands are clean, and **only** handle the P.C. board by its edges.

CAUTION:
When handling electronic components, wear an antistatic strap. Failure to do so could result in component damage.

CAUTION:
For shipping and storage, place the removed P.C. board in an antistatic protective bag. Equipment damage can occur.

P.C. Board

When servicing the P.C. board, follow good handling practices. Mishandling a P.C. board can cause the following:

- P.C. board damage
- Shortened P.C. board life
- Unit malfunctions

Observe the following P.C. board handling rules:

- Make sure hands are clean and free of moisture, oily liquids, etc.
- **Only** handle the P.C. board by its outer edges.
- Do not touch the P.C. board components. Finger contact with the board surface and/or with its components can leave a deposit that will result in board (and component) deterioration.
- When working with electronics, wear an appropriate antistatic strap, and make sure it is correctly grounded.
- Service the removed P.C. board at a static-free workstation that is correctly grounded.
- For shipping and storage, place the removed P.C. board in an antistatic protective bag.

Lubrication Requirements

There are no lubrication requirements for the VersaCare™ Bed.

Preventive Maintenance

WARNING:
Only facility-authorized personnel should service the VersaCare™ Bed. Servicing by unauthorized personnel could result in personal injury or equipment damage.

The VersaCare™ Bed requires an effective maintenance program. We recommend that you perform annual preventive maintenance (PM) and testing for Joint Commission on Accreditation of Healthcare Organizations (JCAHO). PM and testing not only meet JCAHO requirements but will help to make sure of a long, operative life for the VersaCare™ Bed. PM will minimize downtime due to excessive wear.

The following PM schedule guides you through a normal PM procedure on the VersaCare™ Bed. During this PM process, examine each item on the schedule, and make the necessary adjustments.

Follow the PM schedule with the corresponding PM checklist. This checklist is designed to keep a running maintenance history and subsequent repair costs for one VersaCare™ Bed. However, your facility can modify this checklist or design another to fit your needs. Two effective ways to reduce downtime and make sure the patient remains comfortable are keeping close records and maintaining the VersaCare™ Bed.

Every 3 years, the batteries should be replaced by a facility-authorized maintenance personnel.

Preventive Maintenance Schedule

The following preventive maintenance schedule is a reminder designed to guide the technician through a normal preventive maintenance procedure on the VersaCare™ Bed. Examine each element of the schedule and carry out all the necessary adjustments during the preventive maintenance procedure.

The preventive maintenance schedule is intended to be used in conjunction with the preventive maintenance checklist following it. This checklist is designed to keep a running history of maintenance and subsequent repair costs for the VersaCare™ Bed. Keeping close records and maintaining the VersaCare™ Bed are two good ways to reduce downtime and at the same time, keep the nursing staff happy and efficient.

Table 6-1. Preventive Maintenance Schedule

Function	Procedure
Overall condition, frame and welded assemblies	Examine the overall aspect of the bed. Examine that the structure and welded assemblies are in good working condition and that there are no impacts or corrosion. Do any necessary repairs or paint retouches, replace if necessary. Observe the symmetry of the bed and examine that the bed frame and base are not twisted. Do any necessary repairs or paint retouches. Examine that all labels are installed and can be read; replace them if necessary.
Headboard and footboard	Examine the appearance, attachment, and safety of the headboard and footboard. Replace if necessary.
AC power cord	Examine that there are no cuts, scrapes or breaks in the AC power cord or connector. Replace the AC power cable if necessary.

Function	Procedure
Leakage current	Unplug the power connector from the power outlet. Connect the power connector of the bed to the test device and connect this device to the power outlet. Make sure that the bed is correctly supplied by the test device: control unit LEDs lit (unlock the functions if necessary). Take leakage current measures without operating any function. The value must be less than 100 µA. Examine the AC power cable and power supply unit if the value is outside of the specifications. Replace the AC power cable or power supply unit if necessary.
Patient pendant	Disconnect the patient pendant and examine the condition of the connector. Then reconnect or replace the pendant. Press each of the controls to make sure that they activate the correct function and they do not work intermittently. Each movement must be continuous. Replace the pendant if necessary. Troubleshoot in the event of a doubt.
Hilow motors	Inspect the motors for the presence and tightness of the attachment hardware. Replace as necessary. Fully raise and lower the bed. Make sure that there is no friction or abnormal noises and that no audible overload indication can be heard during the movement. Make sure that the Bed Not Down LED lights up on the control pendant and goes out when the bed is in low position. Replace the defective motor(s) in the event of a malfunction. Troubleshoot in the event of a doubt.
Head section motor	Examine the motor for the presence and tightness of the attachment hardware. Replace as necessary. Fully raise and lower the head section. Make sure that there is no friction or abnormal noises and that no audible overload indication can be heard during the movement. Replace in the event of a malfunction.

Function	Procedure
Sleep deck	Fully raise and lower the head section. Examine for binding during the head section movement. Make sure the hard surface and its drive system under the head section are in good condition. Make sure there is no friction or abnormal noises. Replace any damaged parts. Replace if necessary.
CPR release	Examine the handles, cables, and CPR mechanism on the head motor. Make sure that the screws are installed and fully tightened. Examine the condition of the two CPR release handles, CPR cable, and CPR mechanism on the head motor. Operate the head section to the high position, then activate one of the CPR releases. Make sure the head section lowers. Adjust the CPR cable as necessary. Do the same tests on the other side of the bed. Release the CPR handles and make sure the mechanism locks correctly by operating the Head Up control for a few seconds. The head section must rise. Replace the head section motor in the event of a malfunction or the CPR cable if broken.
Emergency Trendelenburg	Activate the *Emergency Trendelenburg* function. Make sure there is no friction or abnormal noises and that no audible overload indication can be heard during the movement. Replace the defective part in the event of a malfunction or abnormal noises. Troubleshoot in the event of a malfunction.

Function	Procedure
Head section gas spring	Inspect the gas spring assembly. Make sure all hardware is installed and fully tightened. Replace as necessary. Make sure there is no oil on its shaft. Raise the head section to the full up position. Activate the CPR function. Make sure the head section lowers rapidly to the intermediate position and then gradually to the low position. Replace the gas springs if necessary.
Knee section motor	Inspect the knee section motor. Examine for presence and tightness of the attachment hardware. Replace as necessary. Fully raise and lower the knee section. Make sure there is no friction or abnormal noises and that no audible overload indication can be heard during the movement. Replace in the event of a malfunction.
Automatic Contour	Make sure the knee section rises up to mid-height when the head section is raised from the low position, and that it lowers automatically when the head section lowers and the head section reaches the low position. Troubleshoot and replace the actuator or defective unit if necessary.
Foot section motor	Raise the knee section to the mid-height position. Inspect the assembly of the foot actuator. Examine for presence and tightness of the attachment hardware. Replace as necessary. Fully raise and lower the foot section. Make sure there is no friction or abnormal noises and that no audible overload indication can be heard during the movement. Replace in the event of a malfunction or abnormal noises.
Chair position	Make sure the Chair, head section, thigh section and foot section functions are not locked out. Activate the chair function and make sure the three sections move to the correct position. Press the *Bed Flat* control, and make sure the sleep deck returns to the flat position. Troubleshoot in the event of a malfunction.

Function	Procedure
Trendelenburg/ Reverse Trendelenburg	Activate the *Trendelenburg* function on the caregiver control panel. Make sure there is no friction or abnormal noises and that no audible overload indication can be heard during the movement. Activate the *Reverse Trendelenburg* function on the caregiver controls. Make sure there is no friction or abnormal noises and that no audible overload indication can be heard during the movement. Replace the defective part in the event of a malfunction or abnormal noises. Troubleshoot in the event of a malfunction.
Battery	Make sure the bed is unplugged from the power outlet. Activate the Battery control. Operate all the functions using the caregiver controls. Recharge the batteries or replace them if necessary. Make sure the battery vent holes in the power supply module are not blocked. Troubleshoot in the event of a malfunction. In all cases examine the date indicated on the battery, replace the battery if the date is over three years.
Siderails	Make sure the head and intermediate siderails are not bent or twisted. Examine the condition of the latch mechanism of each siderail. Remove the siderail cover and make sure the mounting screws are tight. Make sure the siderails lock correctly in the high position. An audible click must be heard. Inspect the cable routing for pinching, binding, and damage. make sure all functions on the caregiver control work correctly. Replace the intermediate siderails or head siderail subassembly if necessary.

Function	Procedure
Foot extension	Inspect the foot motor. Examine for presence and tightness of the attachment hardware. Replace as necessary. Fully extend and retract the foot section. Make sure there is no friction or abnormal noises and that no audible overload indication can be heard during the movement. Replace in the event of a malfunction or abnormal noises.
Pivot points	Make sure the bed articulates without making any noise. Lubricate as necessary.
Casters	Examine for cuts, wear and quality of the tread, etc. Replace if necessary.
Braking and steering	Examine the brakes to see whether the bed moves when the brakes are set. Replace as necessary. Examine the steering mechanism. Replace or adjust the steering control elements of the steering caster if necessary. Replace the caster if necessary. Troubleshoot in the event of a malfunction.
Accessories	Make sure any accessories installed on the bed work correctly. Replace any missing or damaged parts if necessary.
SideCom® Communication System	Inspect and test the communication junction box. Make sure the SideCom® Communication System feature works correctly. Inspect the communication cable, including the male and female pins in the plug.
Scale System	Calibrate the scale. Refer to “Scale Calibration” on page 6-12.
Drive belt (IntelliDrive® Transport System)	Inspect for damage. Replace if any of the following has occurred: • Belt is off of the pulley • Divot is greater that ½" (12.7 mm) in length • Internal steel belt is broken and protruding out of the surface of the belt • Material breakdown due to unknown foreign substance
Transport handle zero (IntelliDrive® Transport System)	Refer to “Throttle Check (IntelliDrive® Transport System)” on page 2-71.
Sleep surface	Inspect for punctures, rips, tears, or other damage to the upper and lower ticking. Replace as necessary.

Preventive Maintenance Checklist

Table 6-2. Preventive Maintenance Checklist

Date																					**Functions**
Hill-Rom	**Manufacturer**																				Overall condition
																					Head and footboard
																					AC power cord
																					Leakage current
																					Patient pendant
																					Hilow motors
																					Head section motor
																					Sleep deck
	Model Number																				CPR release
																					Head section gas spring
																					Knee section motor
																					Automatic contour
																					Foot section motor
																					Chair position
																					Trendelenburg/Reverse
																					Trendelenburg
	Serial Number																				Battery
																					Siderails
																					Foot extension
																					Pivot points
																					Casters
																					Barking and steering
																					Accessories
																					SideCom®
																					IntelliDrive®
Total Cost for this Page																					Sleep surface
																					Labor Time:
																					Repair Cost:
																					Inspected by:
																					Legend L=Lube C=Clean A=Adjust R=Repair or Replace O=Okay N=Not Applicable Remarks:

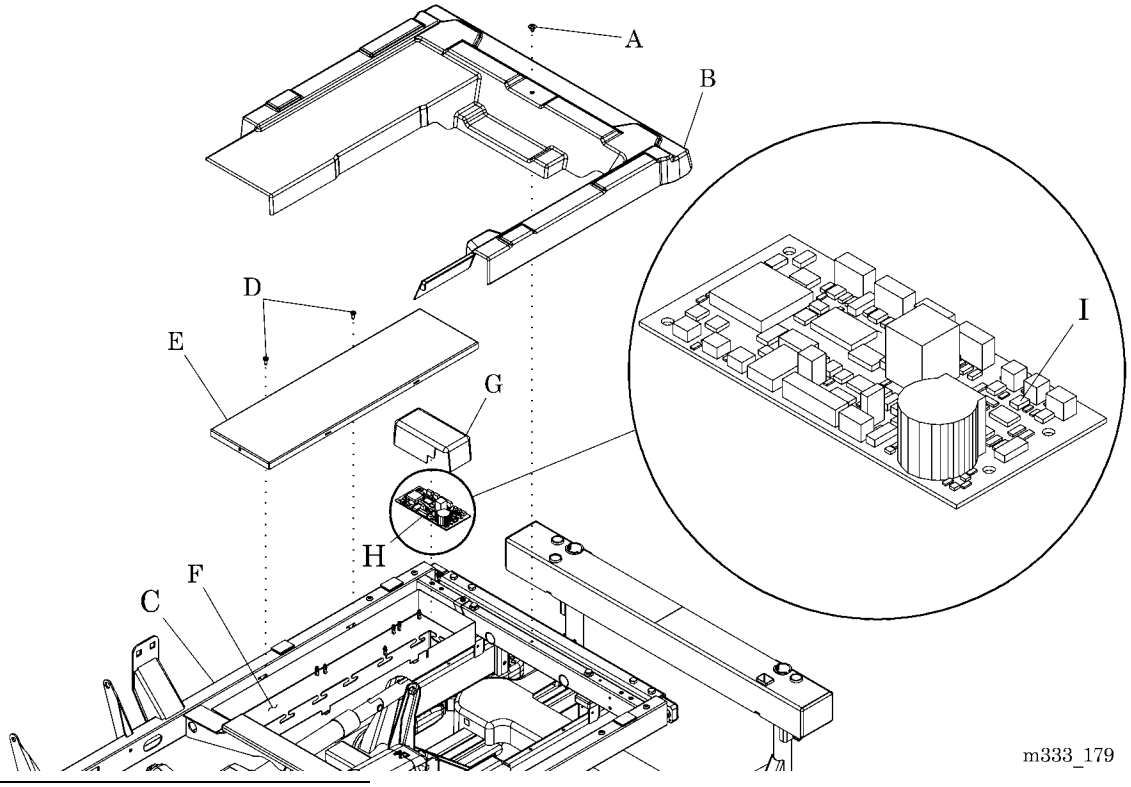
6.1 Scale Calibration

Tools required: T25 Torx®[1] screwdriver
250 lb (113 kg) of weight (in 25 lb (11 kg) increments)

The scale calibration weight must be between 100 and 250 lb (45.0 kg and 113.0 kg).

1. Place the bed in the middle position or a height that is easy to add and remove the weights.
2. Make sure the bed is level.
3. Remove the mattress and footboard.
4. Set the brakes.
5. Raise the head section to the highest position.
6. Remove the screw (A) securing the cover (B) to the bed (C) (see figure 6-1 on page 6-12).

Figure 6-1. Scale Calibration Switch



1. Torx® is a registered trademark of Textron, Inc.

7. Remove the cover (B).

8. Remove the two screws (D) securing the electronics module cover (E) to the electronics module (F).

9. Remove the electronics module cover (E).

10. If installed, remove the shield (G) covering the scale P.C. board (H).

11. Place 25 lb (11 kg) in the center of the bed. **Do not** place the calibration weight on the bed at this time.

SHOCK HAZARD:
The potential for electrical shock exists with electrical equipment. Establish policies and procedures to educate your staff on the risks associated with electrical equipment.

12. Press and **release** the calibration switch (I) on the scale P.C. board.

13. The display changes to 100.0 (45.0 for OIML beds).

14. Use the +/- switches (next to the calibration switch) to adjust the weight up and down to match the calibration weight.

15. When the correct weight is displayed, press and release the calibration switch. (PPM beds only, press and release the calibration switch twice, the weight cannot be adjusted so 100 lb must be used).

16. Lower the head section to the flat position.

17. The display should change to CAL0. Do not touch the bed as it zeros.

18. When the bed is zeroed the display changes to CAL1, and one tone will sound.

19. Add the calibration weight to the left head of the bed, over the load cell.

20. After approximately 30 seconds the display changes to CAL2, and two tones will sound.

NOTE:
The time may vary depending on environmental conditions.

21. Remove the calibration weight.

22. After approximately 30 seconds the display changes to CAL3, and three tones will sound.
23. Add the calibration weight to the left foot of the bed, over the load cell.
24. After approximately 30 seconds the display changes to CAL4, and four tones will sound.
25. Remove the calibration weight
26. After approximately 30 seconds the display changes to CAL5, and five tones will sound.
27. Add the calibration weight to the right foot of the bed, over the load cell.
28. After approximately 30 seconds the display changes to CAL6, and six tones will sound.
29. Remove the calibration weight.
30. After approximately 30 seconds the display changes to CAL7, and seven tones will sound.
31. Add the calibration weight to the right head of the bed over the load cell.
32. The bed will beep 1 time then display the current weight if enabled.
33. Verify the scale display matches the calibration weight.
34. PPM beds only verify that the system works.
35. Remove the calibration weight.
36. Install the covers (B) and (E) and, if applicable, shield (G).

Chapter 7
Accessories

Accessories

For VersaCare™ Bed accessories, see table 7-1 on page 7-1.

Table 7-1. Accessories List

Product Number	Description
P158	Infusion Support System
P276	Oxygen Tank Holder
P2217	Standard IV Pole
P844E48	Patient Helper Adapter Bracket
P3211A	Fracture Frame Adapter Bracket
P2222A	Permanent IV Pole

7.1 Infusion Support System—P158

Tools required: None

WARNING:
Do not exceed IV rod weight capacity. Personal injury or equipment damage could occur.

Hang up to 40 lb (18.1 kg) on an IV rod.

CAUTION:
Do not mount infusion pumps on the lower section of an IV rod. Interference with head section articulation could result.

Hang pumps only on the upper section of an IV rod.

WARNING:
When lowering the upper section of an IV rod, always grasp and hold the upper section of the pole before pulling the release knob. Failure to do so could result in personal injury or equipment damage.

Installation

1. Install the P163 adapter bracket into the desired location.
2. Install the ISS pole into the adapter bracket.

Removal

Reverse the installation procedure to remove the ISS pole.

7.2 Oxygen Tank Holder—P276

Tools required: None

WARNING:
If the oxygen tank holder is placed at the foot end of the bed, make sure the Knee Up/Down controls are locked out. Failure to do so can result in caregiver, patient, or visitor injury if the foot section fully lowers and the holder becomes dislodged from the bed.

Installation

1. Install the oxygen tank holder into an equipment socket at any corner of the bed.
2. Place one E-size oxygen tank in the holder.
3. Tighten the holder thumbscrew.

NOTE:
The thumbscrew keeps the oxygen tank from rotating in the holder.

Removal

1. Loosen the thumbscrew that holds the tank securely in the holder.
2. Lift the tank out of the holder.
3. Lift up on the tank holder, and remove it from the equipment socket.

7.3 Standard IV Pole—P2217

Tools required: None

WARNING:
Do not exceed IV rod weight capacity, personal injury or equipment damage could result.

WARNING:
When lowering the upper section of an IV rod, always grasp and hold the upper section of the pole before pulling the release knob. Failure to do so could result in personal injury or equipment damage.

Installation

1. Install the IV pole in an equipment socket at any corner of the bed.
2. Rotate the IV pole a quarter turn to lock it into place.

Removal

Reverse the installation procedure to remove the IV Rod.

7.4 Patient Helper Adapter Bracket—P844E48

Tools required: None

Installation

Refer to the manufacturer's instructions for installation.

Removal

Refer to the manufacturer's instructions for removal.

7.5 Fracture Frame Adapter Bracket—P3211A

Tools required: None

Installation

Refer to the manufacturer's instructions for installation.

Removal

Refer to the manufacturer's instructions for removal.

7.6 Permanent IV Pole—P2222A

Tools required: T25 Torx®[1] screwdriver
13mm open end wrench

Installation

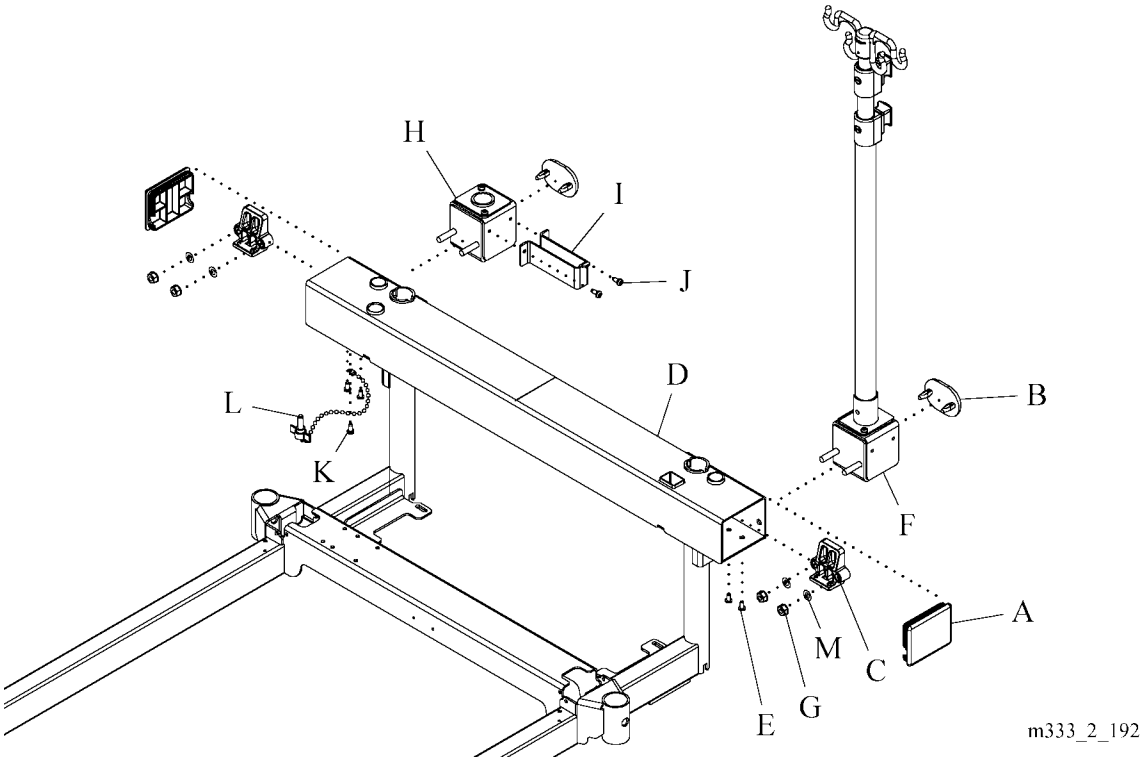
1. Set the brakes.

WARNING:
Unplug the bed from its power source. Failure to do so could result in personal injury or equipment damage.

2. Unplug the bed from its power source.

3. Remove the end caps (A) (see figure 7-1 on page 7-7).

Figure 7-1. Permanent IV Pole



1. Torx® is a registered trademark of Textron, Inc.

4. Remove the bumpers (B).
5. Do the following for each side of the bed:
   a. Insert the bracket (C) into the tube frame (D).
   b. Align the holes in the bracket (C) with the holes in the tube frame (D).
   c. Install, but do not tighten, the screws (E) through the tube frame (D) into the bracket (C).
   d. Install the weldment (F) through the tube frame (D) into the bracket (C).
   e. Install the two washers (M) onto the weldment (F).
   f. Install the two nuts (G) onto the weldment (F).
   g. Tighten the screws (E) and nuts (G).
   h. Install the end cap (A) into the tube frame (D).
   i. Install the bumper (B) into the weldment (F).
6. For the right side weldment (H), do the following:
   a. Align the holes in the bracket (I) with the holes in the weldment (H).
   b. Install the two screws (J) to secure the bracket (I) to the weldment (H).
   c. Install the screw (K) to secure the chain and knob (L) to the tube frame (D).
   d. Install the chain and knob (L) into the weldment (H).

Removal

1. Perform the removal procedure in reverse order.
2. Do the “Function Checks” on page 2-6.

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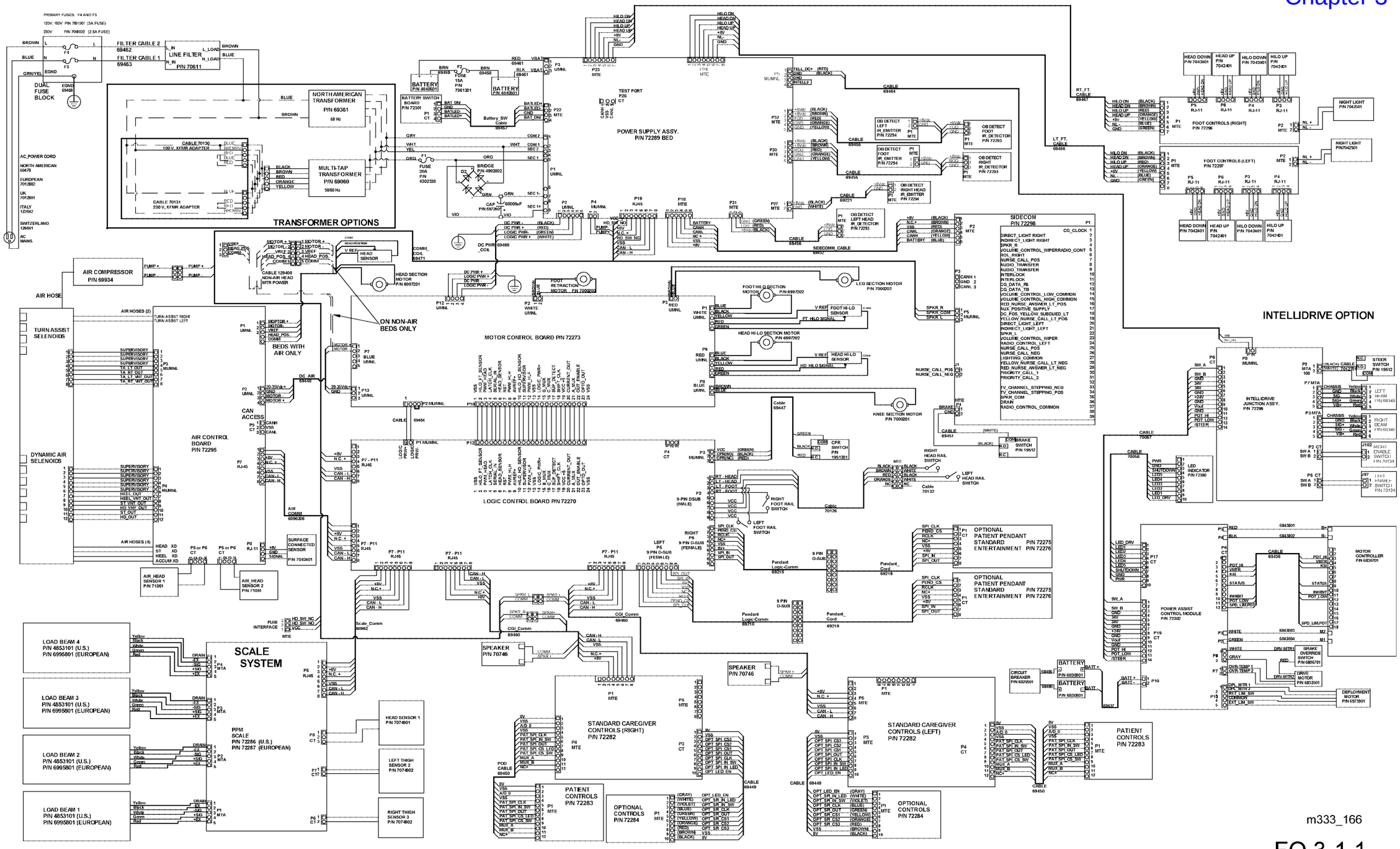
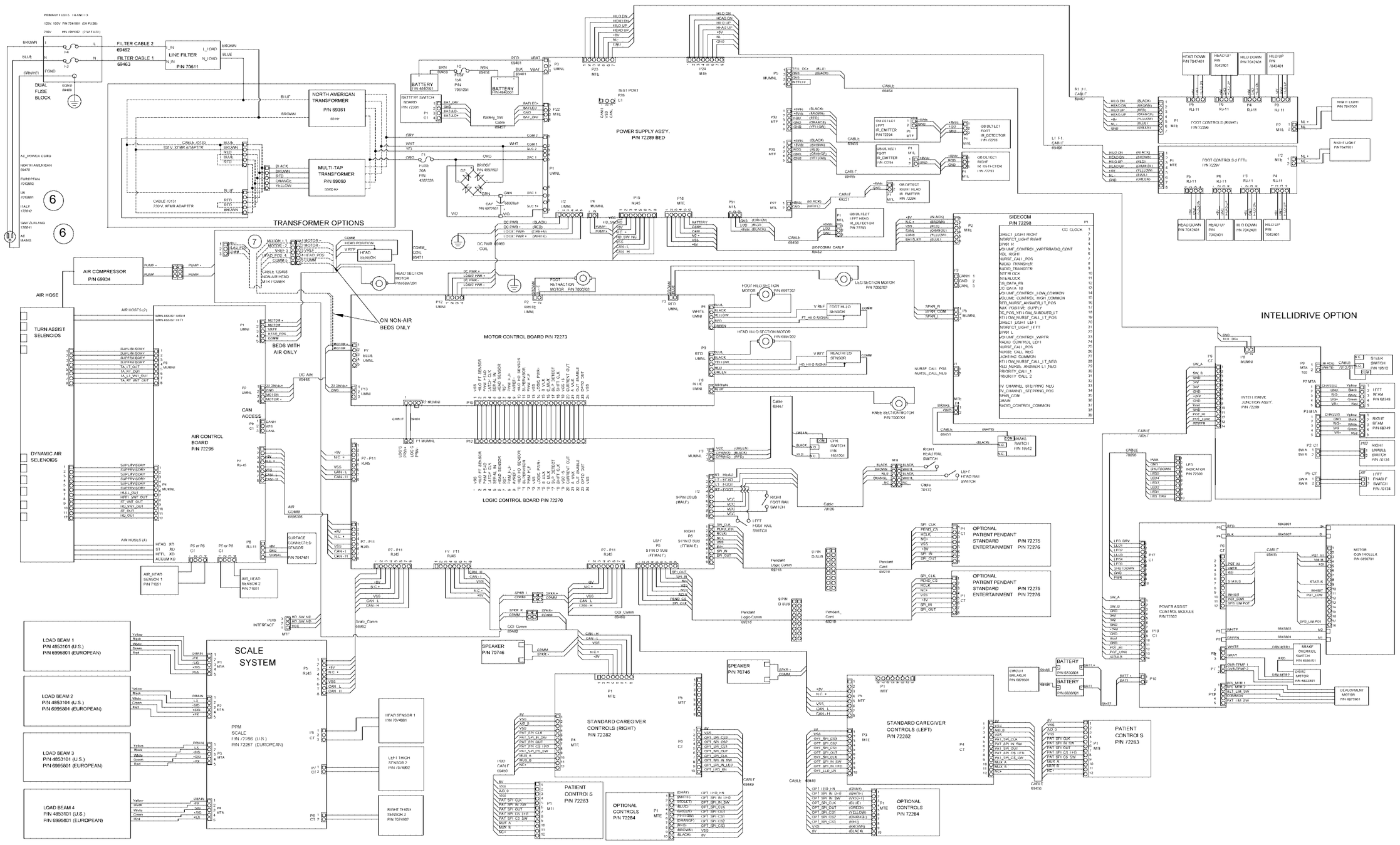
Electronics Schematic (P3200) (Sheet 1 of 3)



Electronics Schematic (P3200) (Sheet 2 of 3)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NORTH AMERICAN TRANSFORMER P/N 69351
MULTI-TAP TRANSFORMER P/N 69060
POWER SUPPLY ASSY. P/N 72289 BED
BATTERY P/N 4840001
BATTERY SWITCH BOARD P/N 72301
AIR COMPRESSOR P/N 69934
AIR HOSE
TURN ASSIST SOLENOIDS
DYNAMIC AIR SELENOIDS
BEDS WITH AIR ONLY
ON NON-AIR BEDS ONLY
AIR CONTROL BOARD P/N 72295
MOTOR CONTROL BOARD P/N 72273
LOGIC CONTROL BOARD P/N 72270
SCALE SYSTEM
PPM SCALE I/N 72286 (U.S.) P/N 72287 (EUROPEAN)
LOAD BEAM 1 P/N 4853101 (U.S.) P/N 6995801 (EUROPEAN)
LOAD BEAM 2 P/N 4853101 (U.S.) P/N 6995801 (EUROPEAN)
LOAD BEAM 3 P/N 4853101 (U.S.) P/N 6995801 (EUROPEAN)
LOAD BEAM 4 P/N 4853101 (U.S.) P/N 6995801 (EUROPEAN)
HEAD SENSOR 1 P/N 7042001
LEFT HIGH SENSOR 2 P/N 7042002
RIGHT THIGH SENSOR 3 P/N 7074907
SPEAKER P/N 70746
STANDARD CAREGIVER CONTROLS (RIGHT) P/N 72282
STANDARD CAREGIVER CONTROLS (LEFT) P/N 72282
PATIENT CONTROLS P/N 72283
OPTIONAL CONTROLS P/N 72284
OPTIONAL PATIENT PENDANT STANDARD ENTERTAINMENT P/N 72276
OPTIONAL PATIENT PENDANT STANDARD ENTERTAINMENT P/N 72275
SIDECOMM P/N 72298
INTELLIDRIVE OPTION
INTELLIDRIVE JUNCTION ASSY. P/N 72299
POWER ASSIST CONTROL MODULE P/N 72302
FOOT CONTROLS (RIGHT) P/N 72296
FOOT CONTROLS (LEFT) P/N 72297
NIGHT LIGHT P/N 7047501
HEAD DOWN P/N 7047401
HEAD UP P/N 7042401
HILO DOWN P/N 7042401
HILO UP P/N 7042401
BATTERY P/N 6830901
OVERHEAD SWITCH P/N 6006101
DEPLOYMENT MOTOR P/N 6873961
MOTOR CONTROLLER P/N 6855701
LEFT HEAD RAIL SWITCH
RIGHT HEAD RAIL SWITCH
RIGHT FOOT RAIL SWITCH
LEFT FOOT RAIL SWITCH
KNEE SECTION MOTOR P/N 7000701
LEG SECTION MOTOR P/N 7000702
FOOT HI-LO SECTION MOTOR P/N 6997202
HEAD HI-LO SECTION MOTOR P/N 6997202
FOOT ARTICULATION MOTOR P/N 7000703
AIR HOSES (2)
AIR HOSES (4)
SURFACE CONNECTED SENSOR P/N 7047401
AIR SENSOR 1 P/N 71051
AIR SENSOR 2 P/N 71051
AIR COMM 69365/66
CGI Comm 69462
CGI Comm 69463
CGI Comm 69400
Pendant Logic Comm 69218
Pendant Cord 69219
Pendant Cord 69219
Cable 70126
Cable 70132
Cable 70056
Cable 69451
Cable 69449
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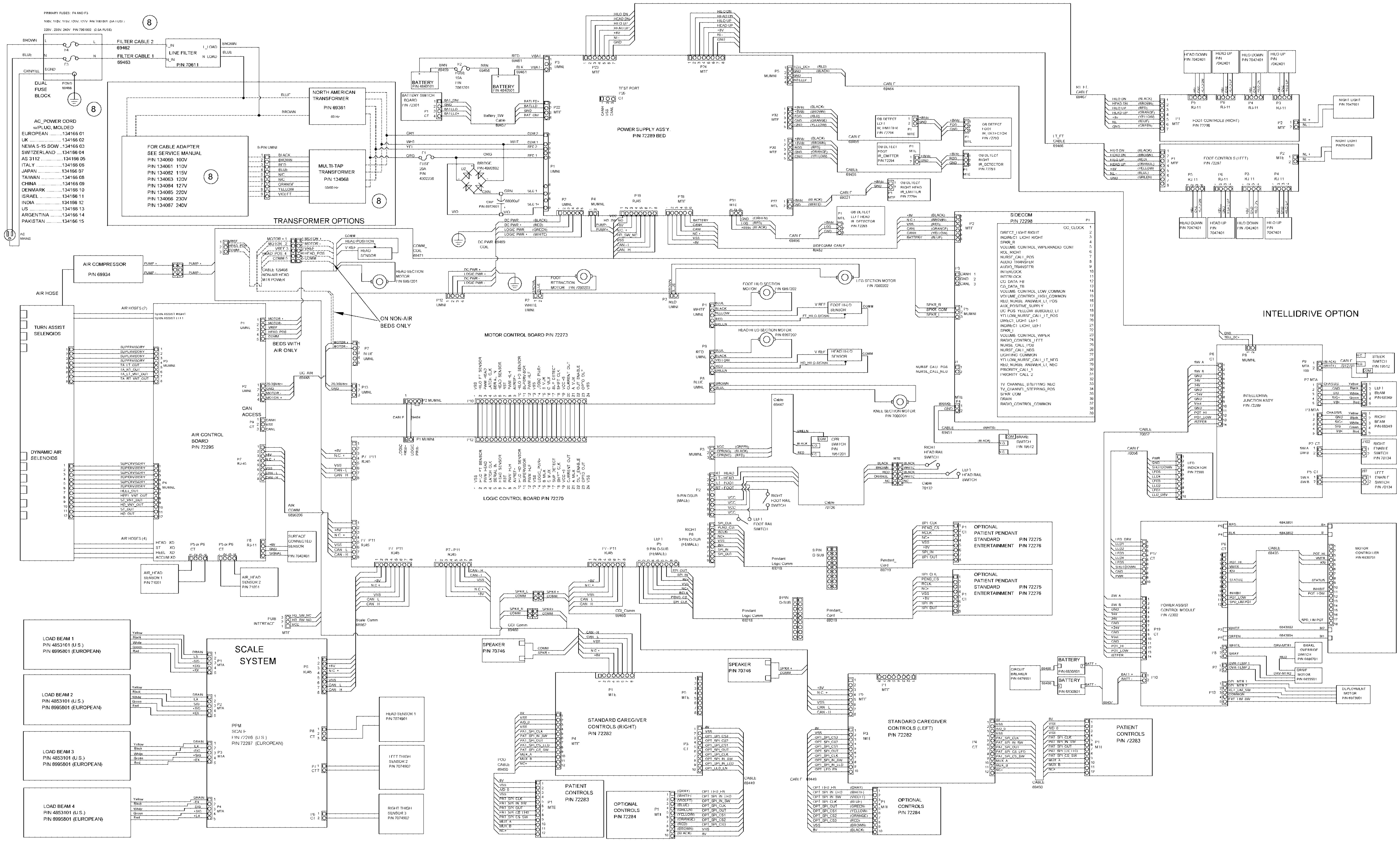
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MULTI-TAP TRANSFORMER P/N 134068
LINE FILTER P/N 70611
DUAL FUSE BLOCK
AC_POWER CORD w/PLUG, MOLDED
AIR COMPRESSOR P/N 69934
TURN ASSIST SELENOIDS
DYNAMIC AIR SELENOIDS
AIR CONTROL BOARD P/N 72295
POWER SUPPLY ASS'Y. P/N 72289 BED
MOTOR CONTROL BOARD P/N 72273
LOGIC CONTROL BOARD P/N 72270
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INTELLIDRIVE JUNCTION ASS'Y P/N 72299
POWER ASSIST CONTROL MODULE P/N 72302
MOTOR CONTROLLER P/N 6830701
SCALE SYSTEM
LOAD BEAM 1 P/N 4853101 (U.S.) P/N 6995801 (EUROPEAN)
LOAD BEAM 2 P/N 4853101 (U.S.) P/N 6995801 (EUROPEAN)
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STANDARD CAREGIVER CONTROLS (RIGHT) P/N 72282
STANDARD CAREGIVER CONTROLS (LEFT) P/N 72282
PATIENT CONTROLS P/N 72283
OPTIONAL CONTROLS P/N 72284
OPTIONAL PATIENT PENDANT STANDARD P/N 72275 ENTERTAINMENT P/N 72276
SPEAKER P/N 70746
ON NON-AIR BEDS ONLY
BEDS WITH AIR ONLY

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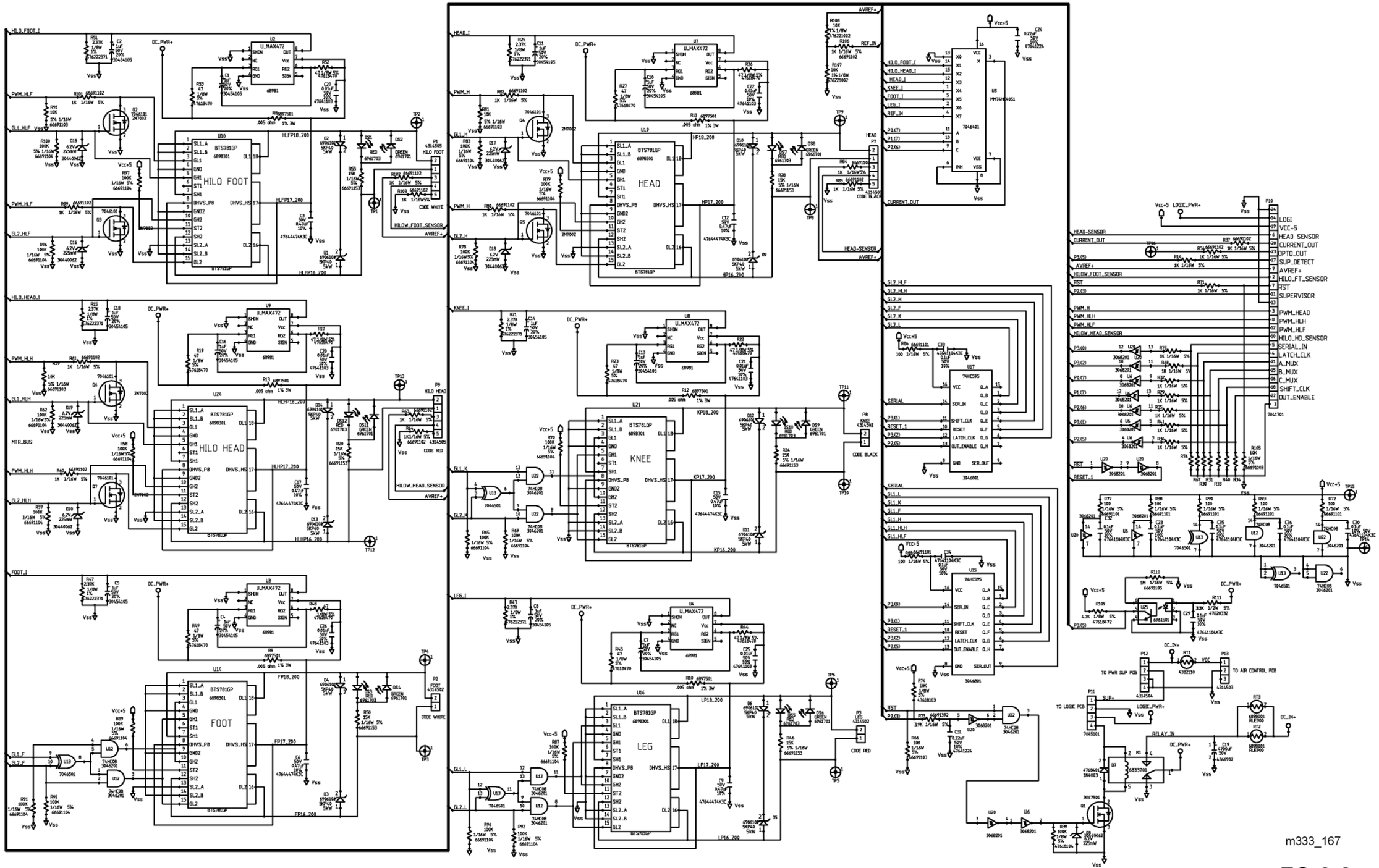

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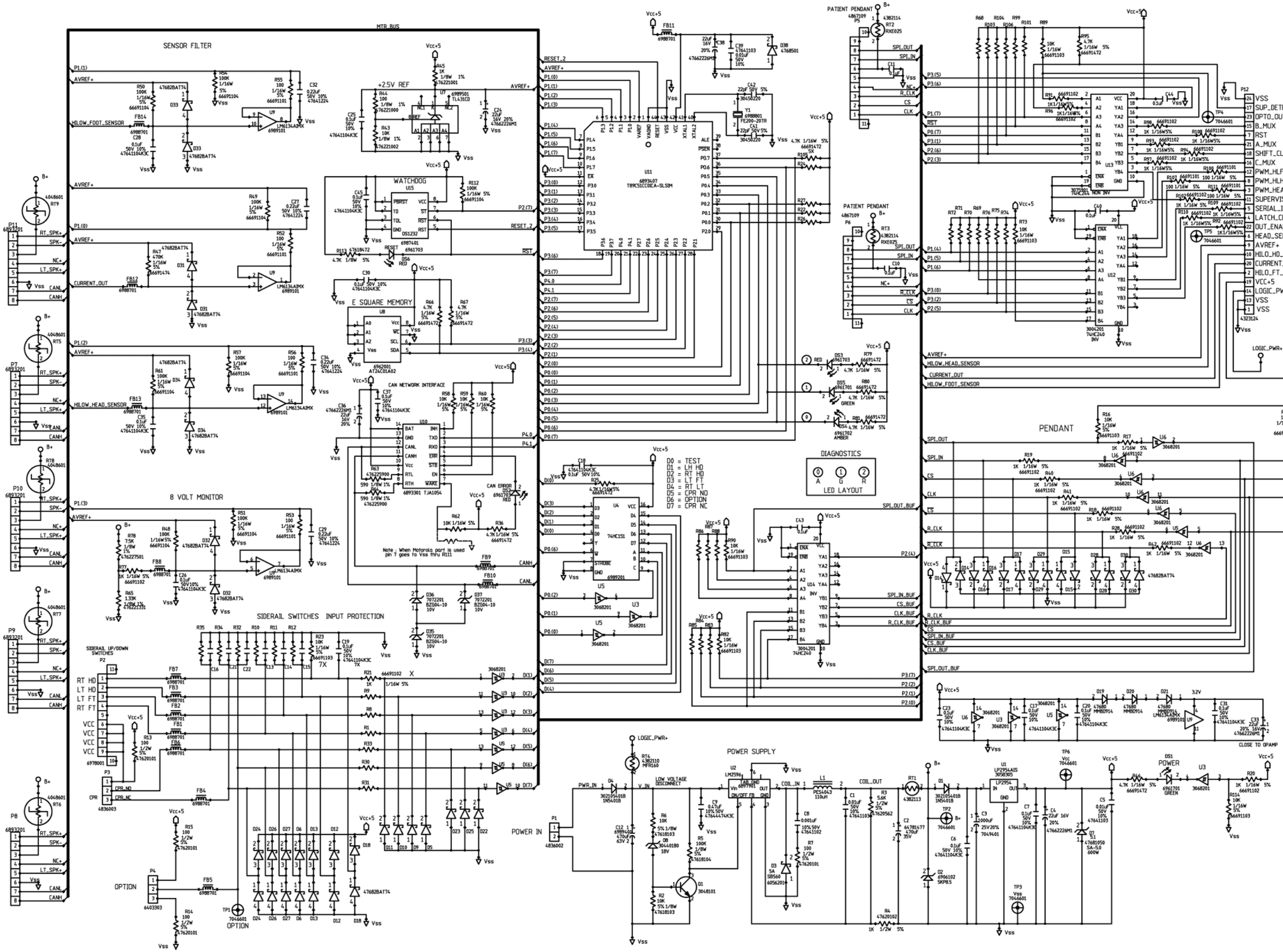
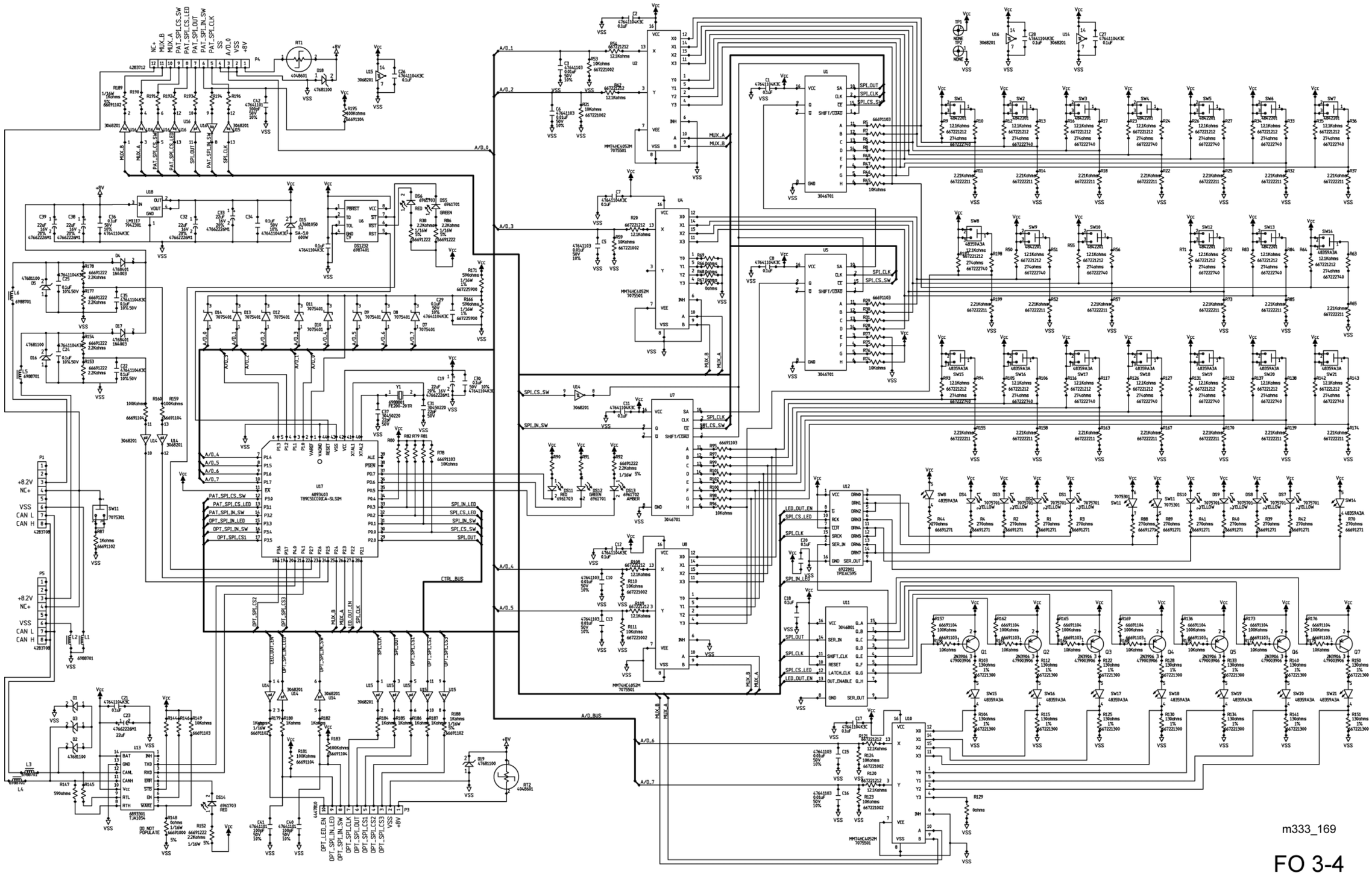
FO 3-2


MTR BUS
SENSOR FILTER
+2.5V REF
WATCHDOG
E SQUARE MEMORY
CAN NETWORK INTERFACE
8 VOLT MONITOR
SIDERAIL SWITCHES INPUT PROTECTION
SIDERAIL UP/DOWN SWITCHES
OPTION
POWER IN
POWER SUPPLY
LOW VOLTAGE DISCONNECT
PATIENT PENDANT
PENDANT
DIAGNOSTICS
LED LAYOUT
D0 = TEST
D1 = LH HD
D2 = RT HD
D3 = LT FT
D4 = RT LT
D5 = CPR NO
D6 = OPTION
D7 = CPR NC
Note : When Motorola part is used pin 7 goes to Vss thru R111
TO MOTOR CONTROL BRD
CLOSE TO OPAMP
m333_168
FO 3-3



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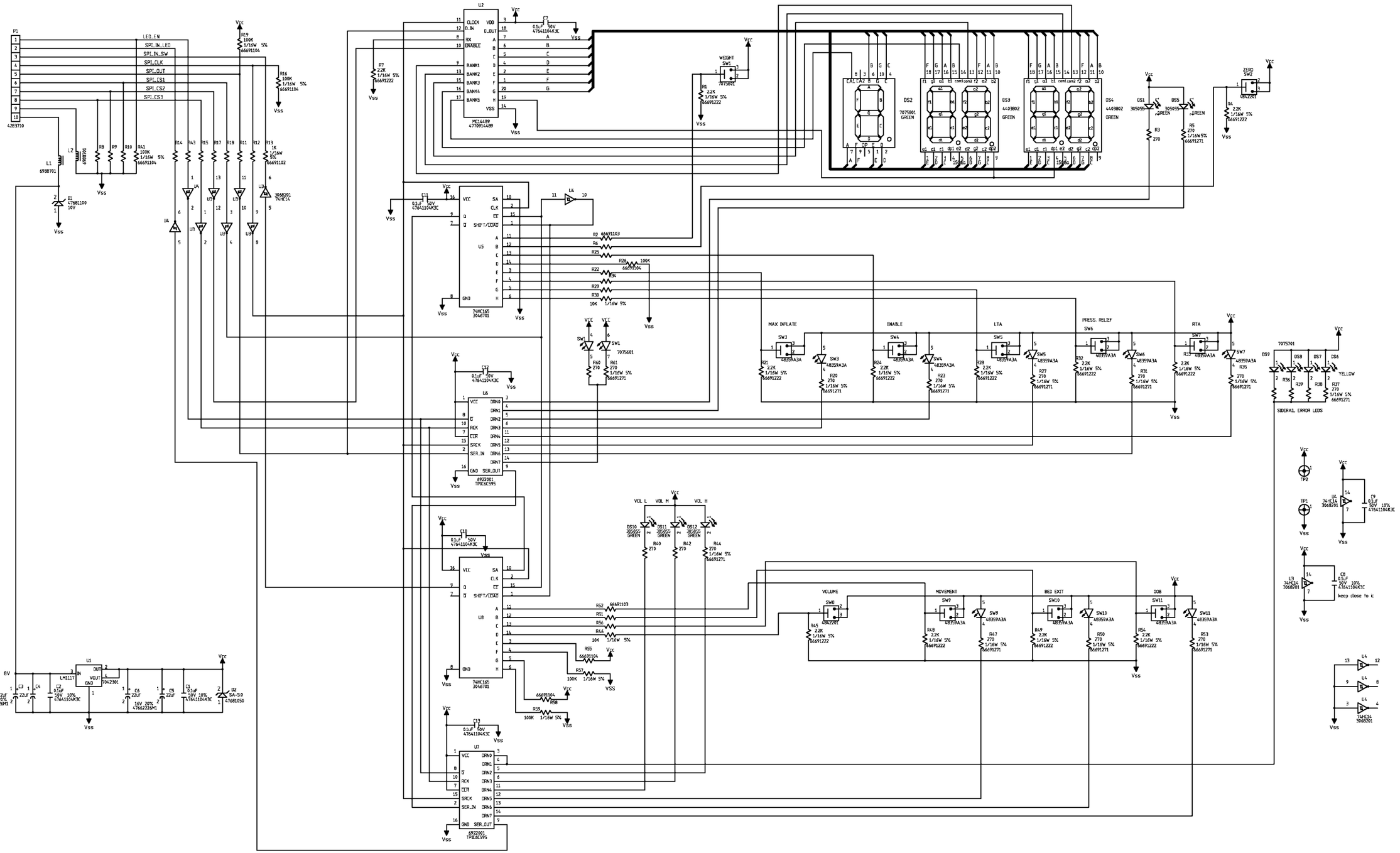
FO 3-4



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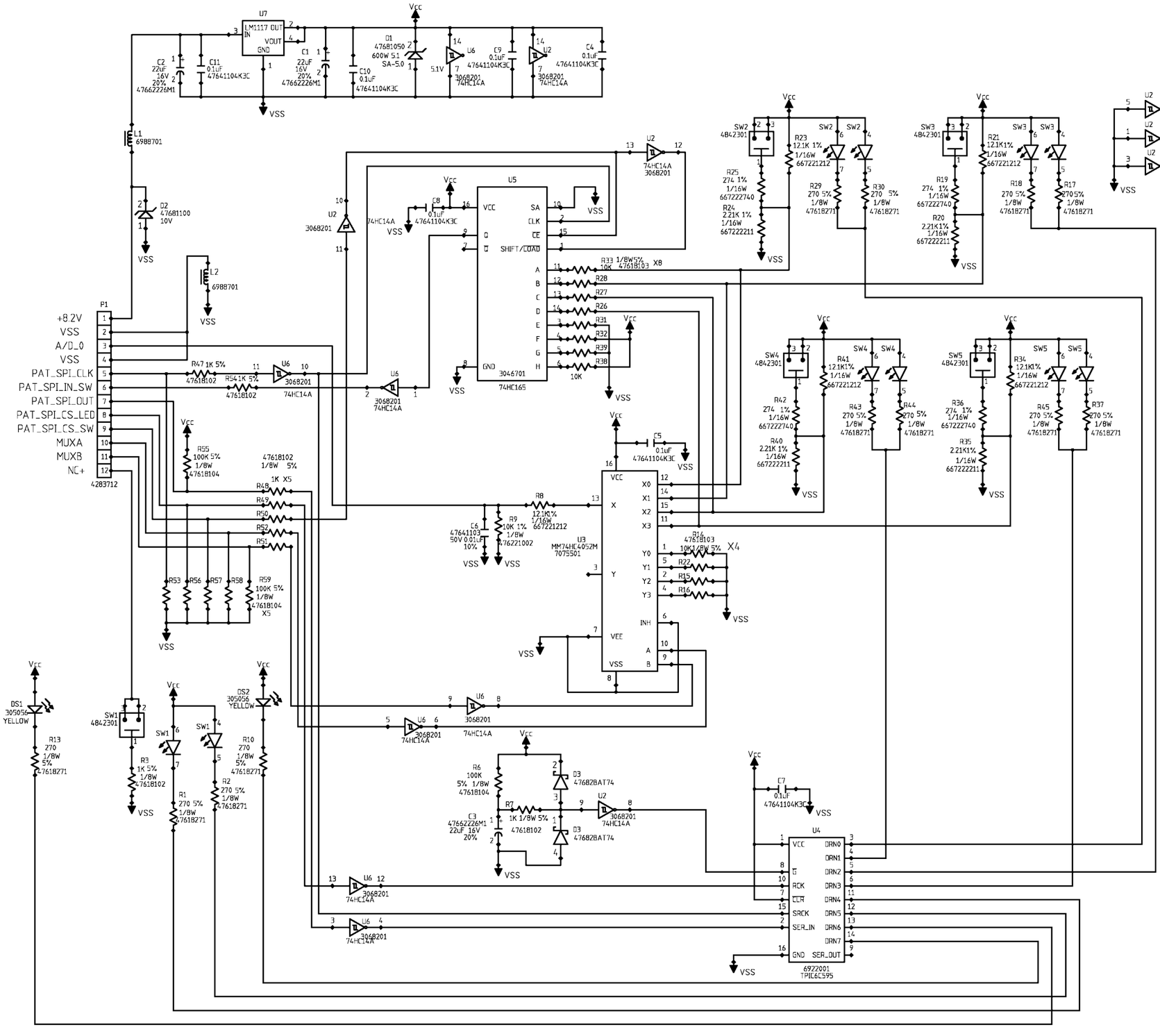
FO 3-5

Patient Controls Schematic



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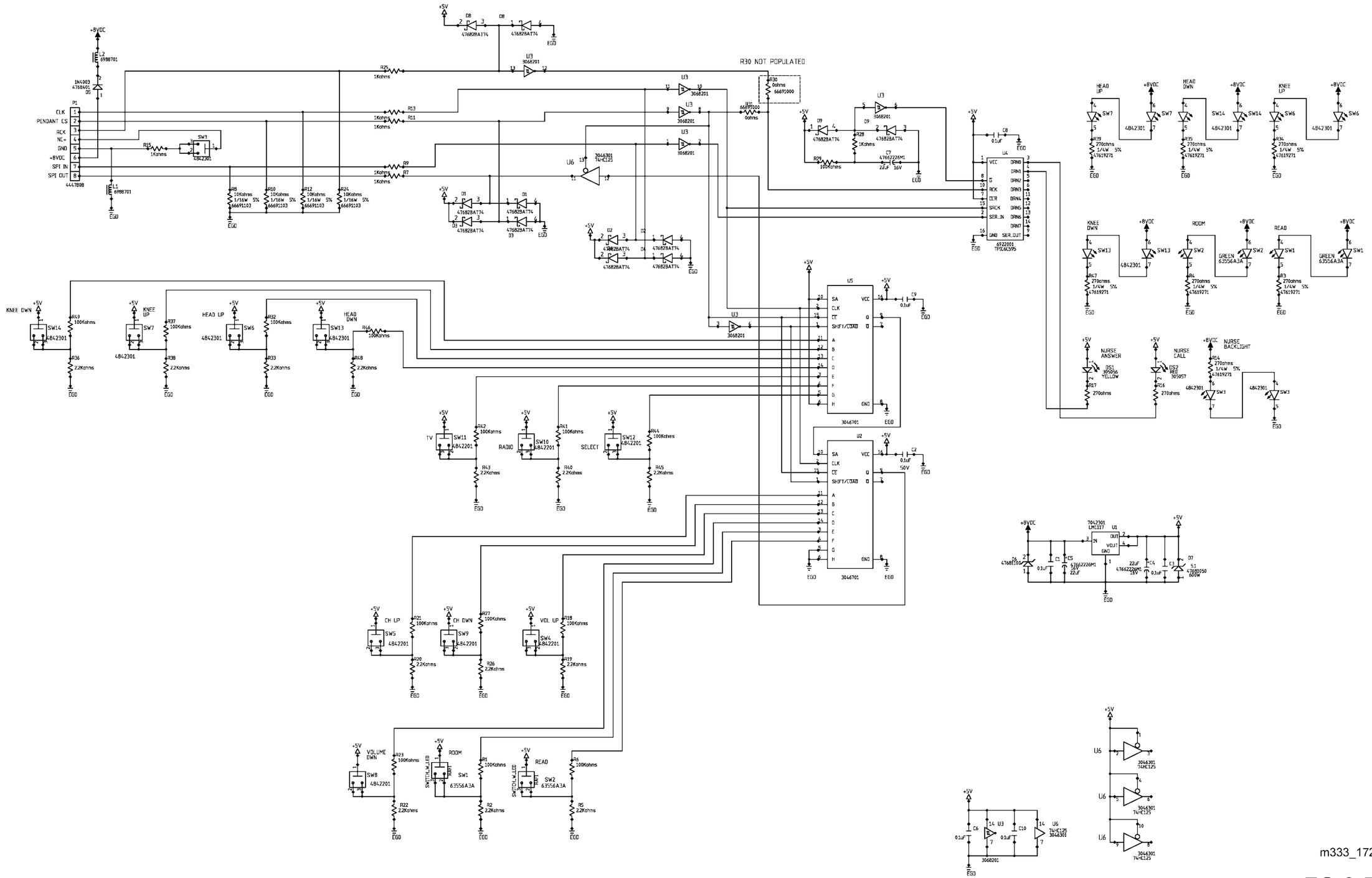
FO 3-6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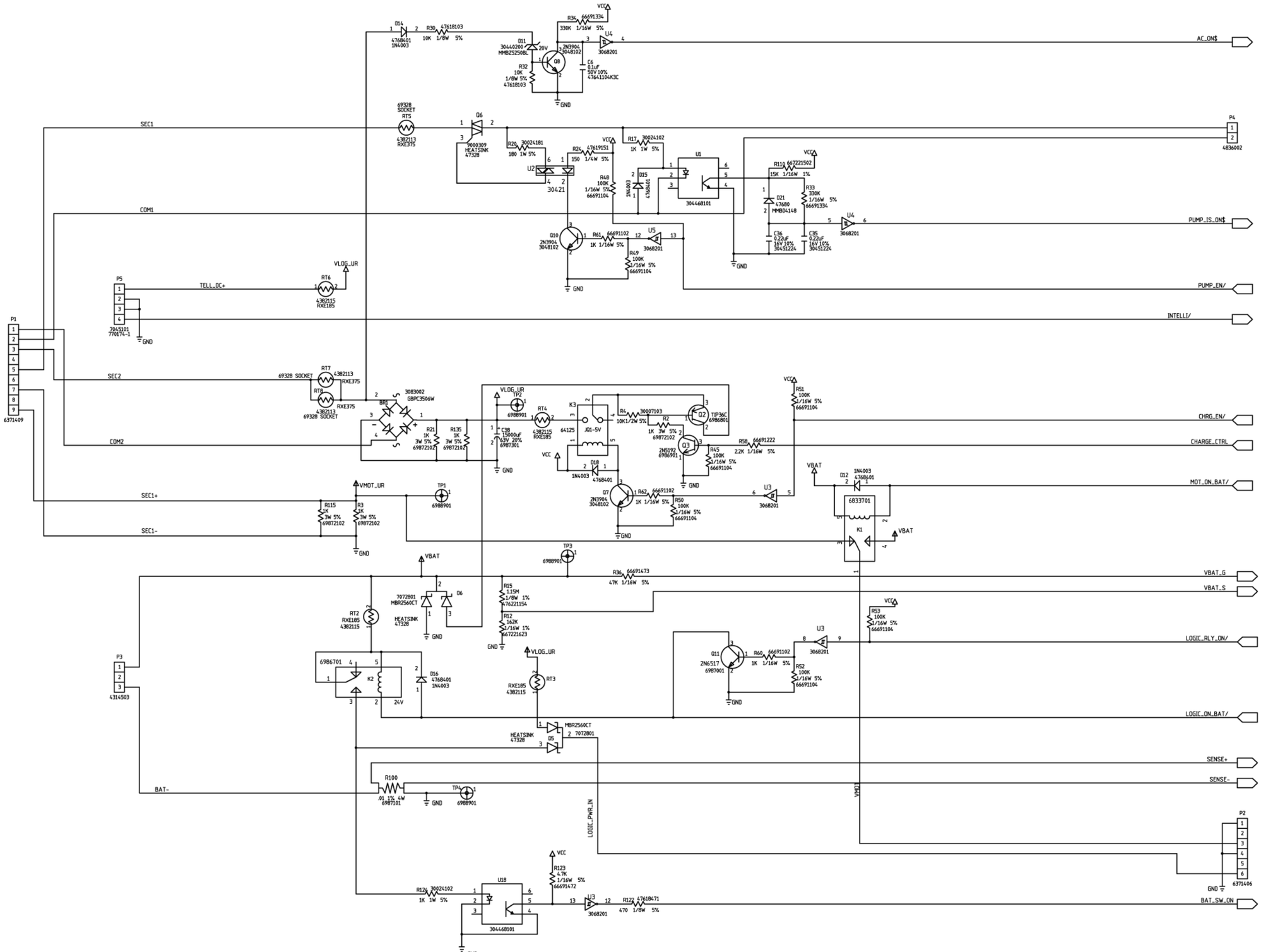
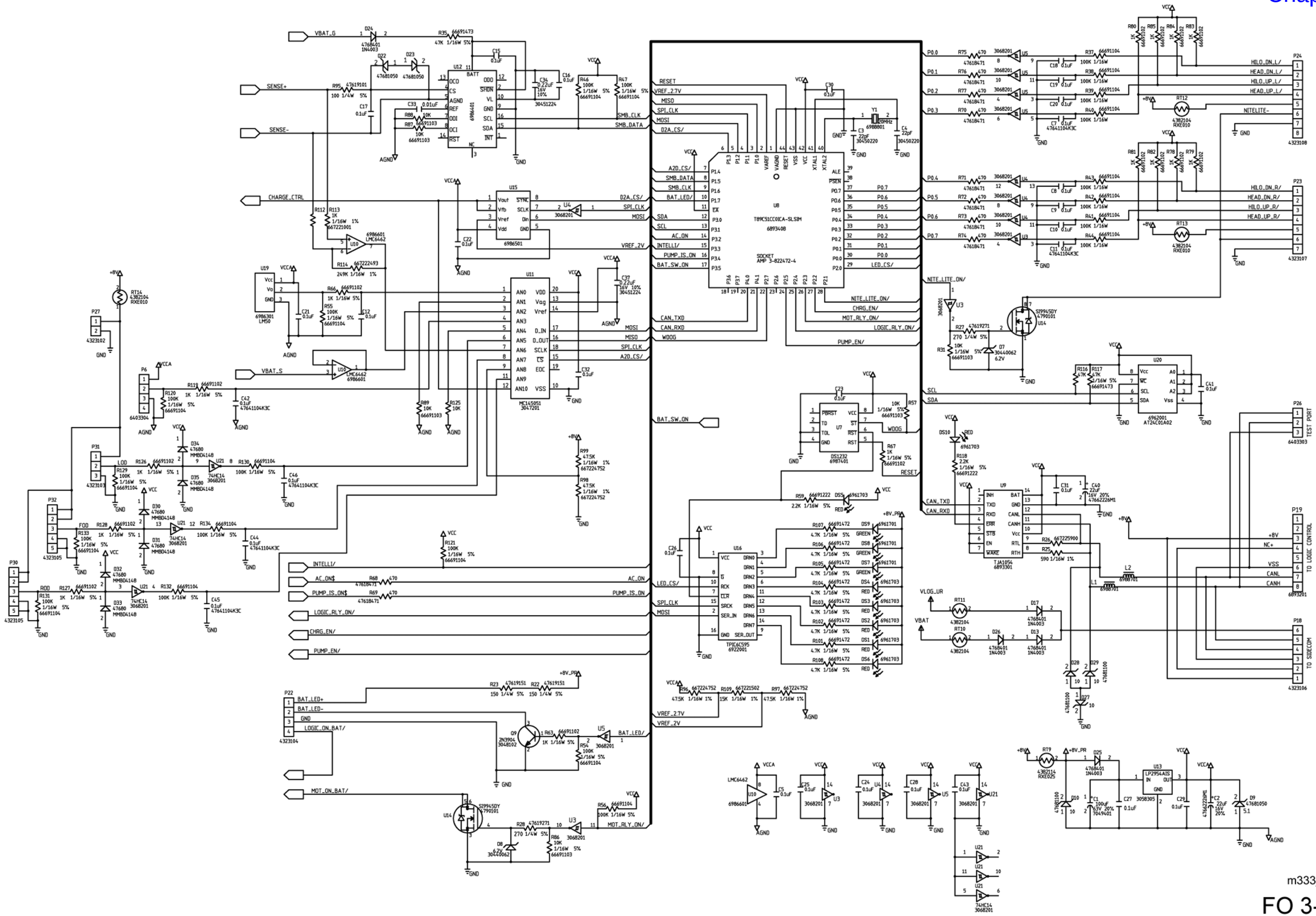
+5V
+8VDC
EGD
CLK
PENDANT CS
RCK
NC
GND
+8VDC
SPI IN
SPI OUT
HEAD UP
HEAD DWN
KNEE UP
KNEE DWN
ROOM
READ
NURSE ANSWER
NURSE CALL
NURSE BACKLIGHT
TV
RADIO
SELECT
CH UP
CH DWN
VOL UP
VOLUME DWN
SHIFT/LOAD
SER_IN
SER_OUT
RCK
CLR
SRCK
GND
VCC
VOUT
LM1117



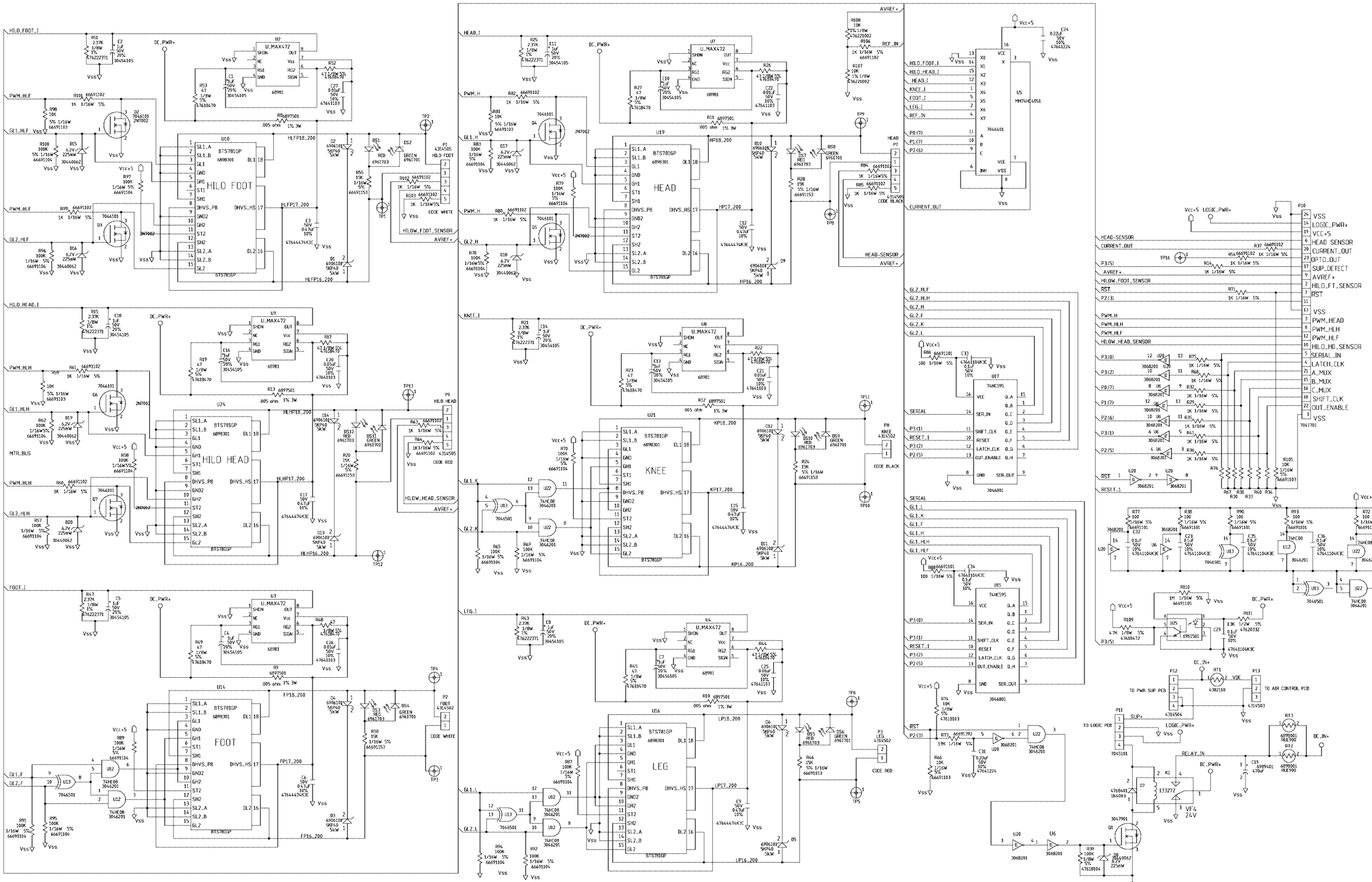
m333_261

FO 3-8.1



m333_262

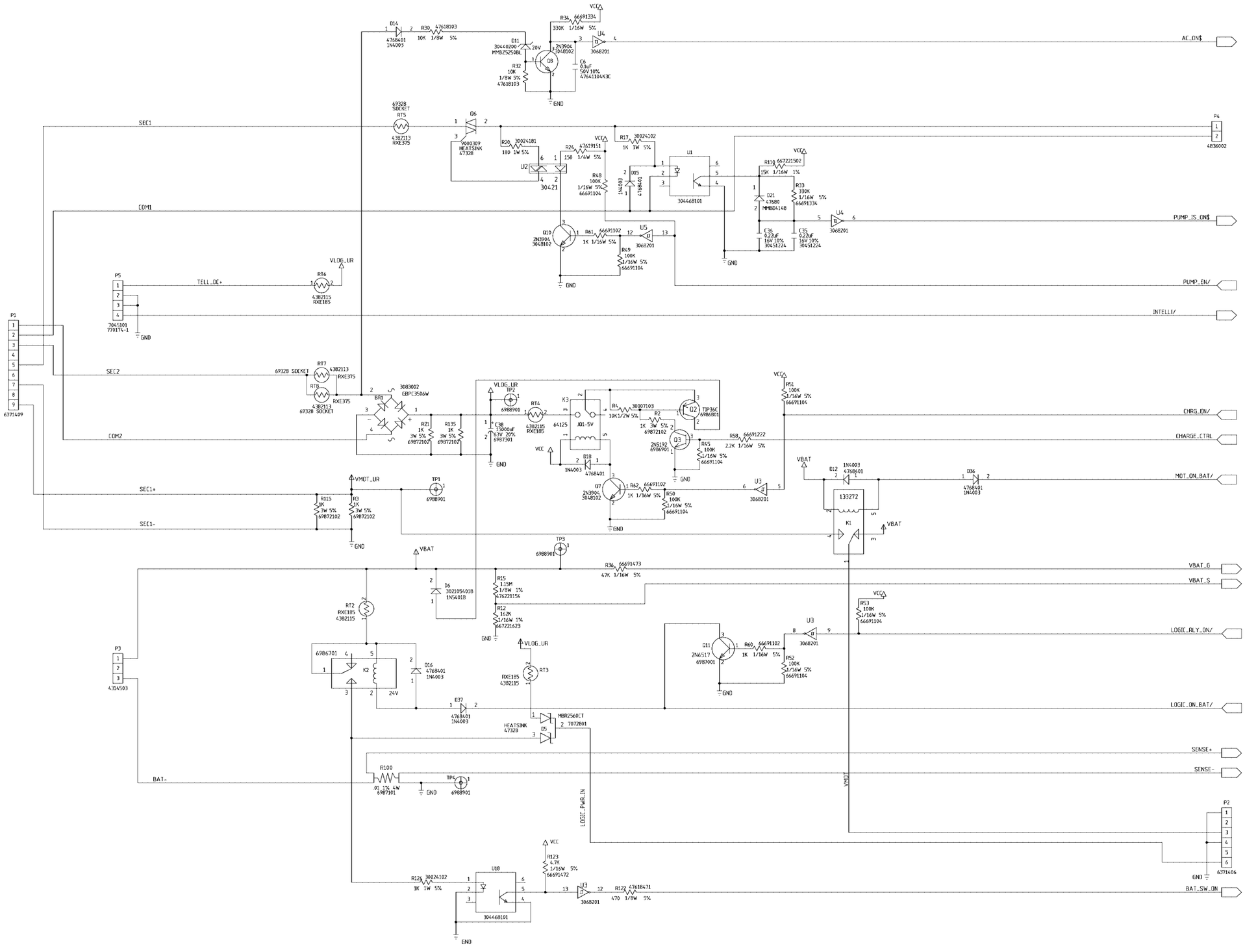
FO 3-8.2

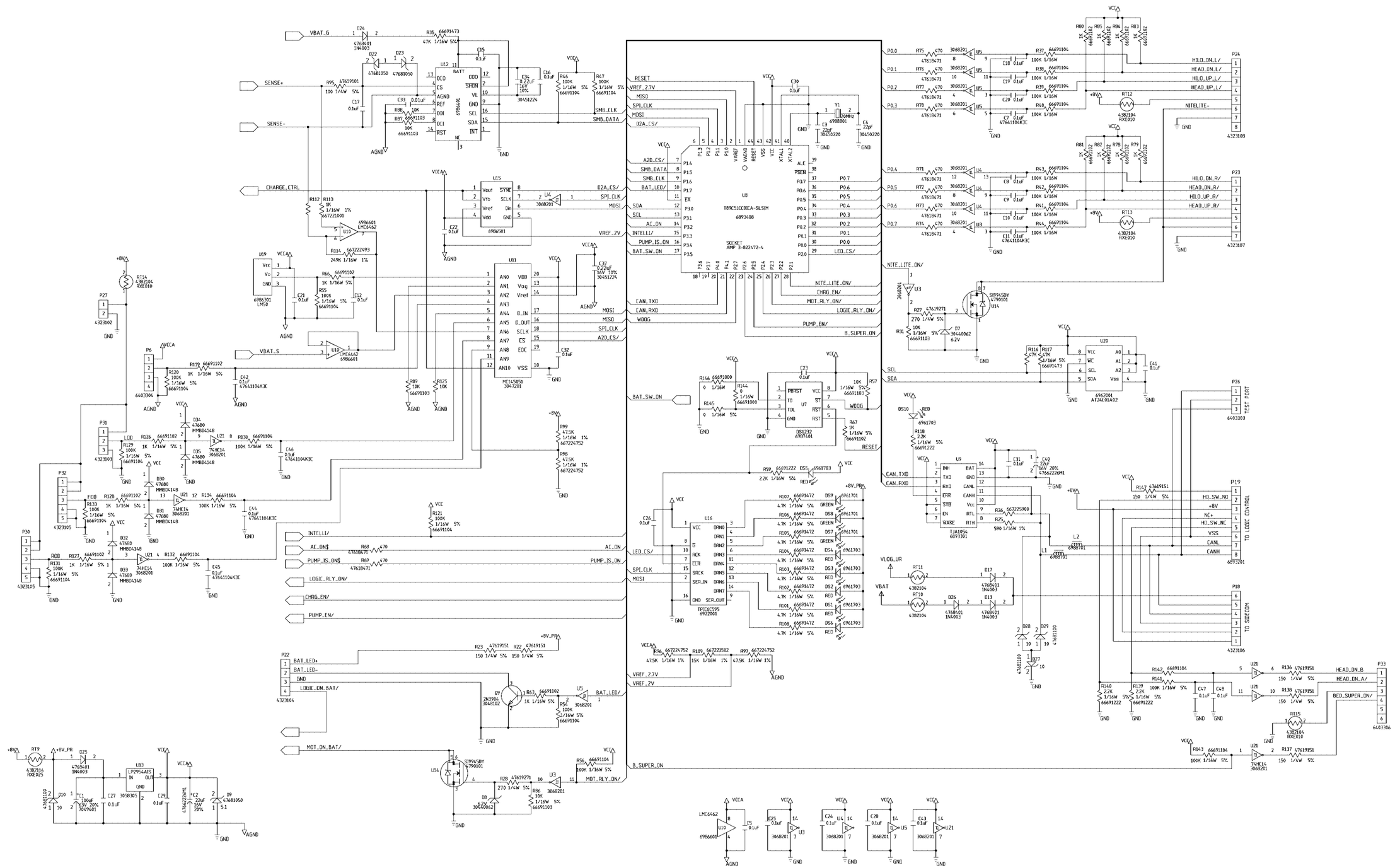


m333_2_276

FO 3-9

Power Supply P.C. Board (PN 70786) (Sheet 1 of 2)

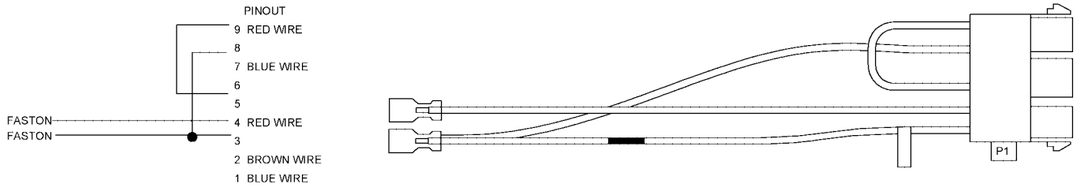




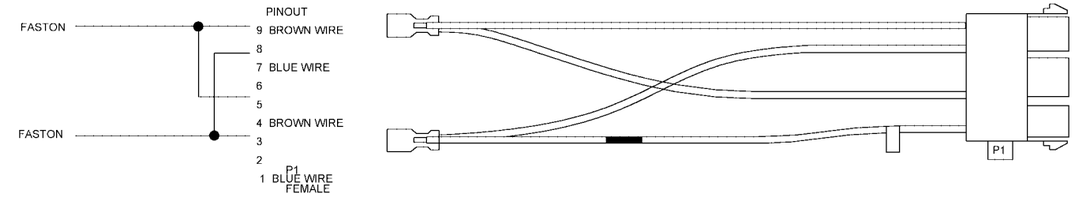
m333_2_278

FO 3-10.2

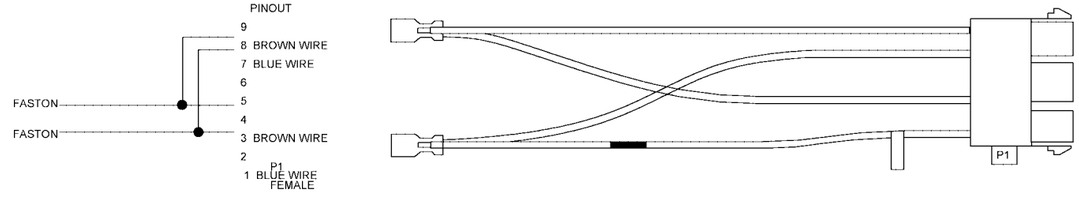
Transformer Adapter Cables



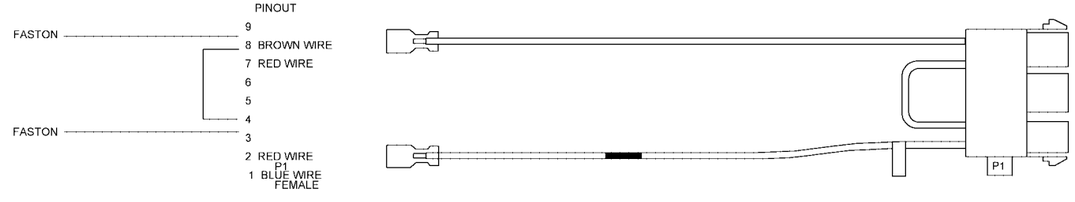
134060, 100 V



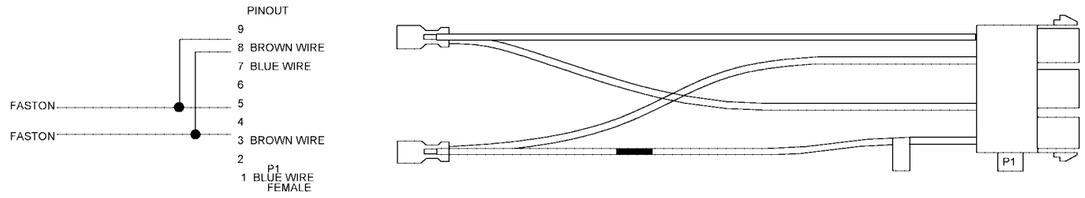
134064, 127 V



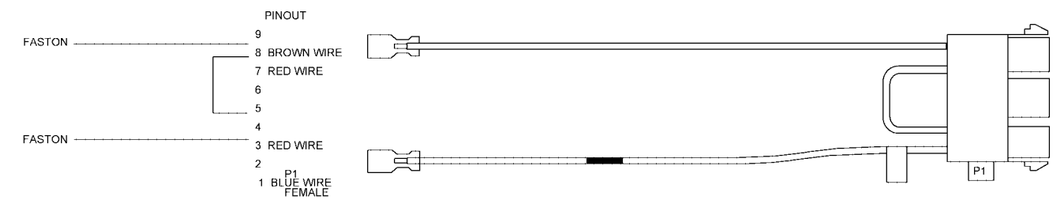
134061, 110 V



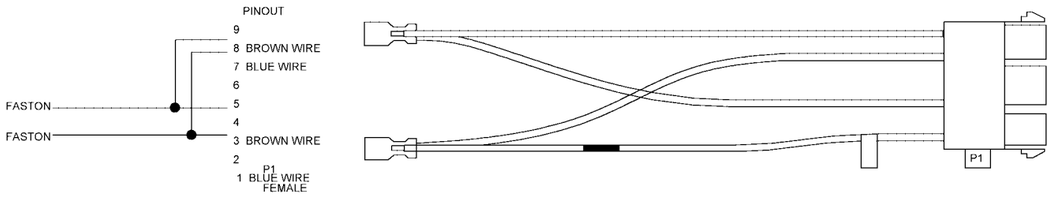
134065, 220 V



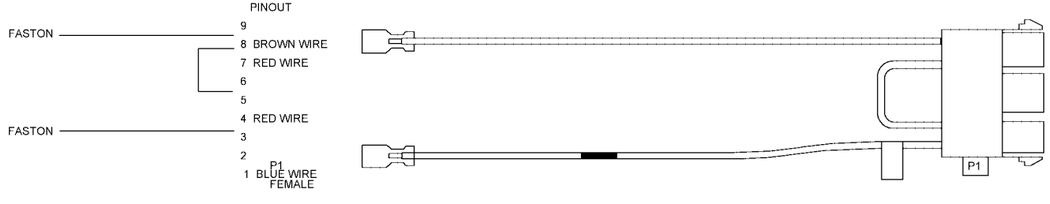
134062, 115 V



134066, 230 V



134063, 120 V



134067, 240 V